INSIDE: WAGING WAR ON NOXIOUS WEEDS

Montana Outdoors

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JULY–AUGUST 2011

LOON-A-TICS

Why we're crazy about these amazing birds

TO THE BAT CAVE!

WHY OUR SKIES ARE SO BIG

EASTERN FOX SQUIRRELS MOVE WEST

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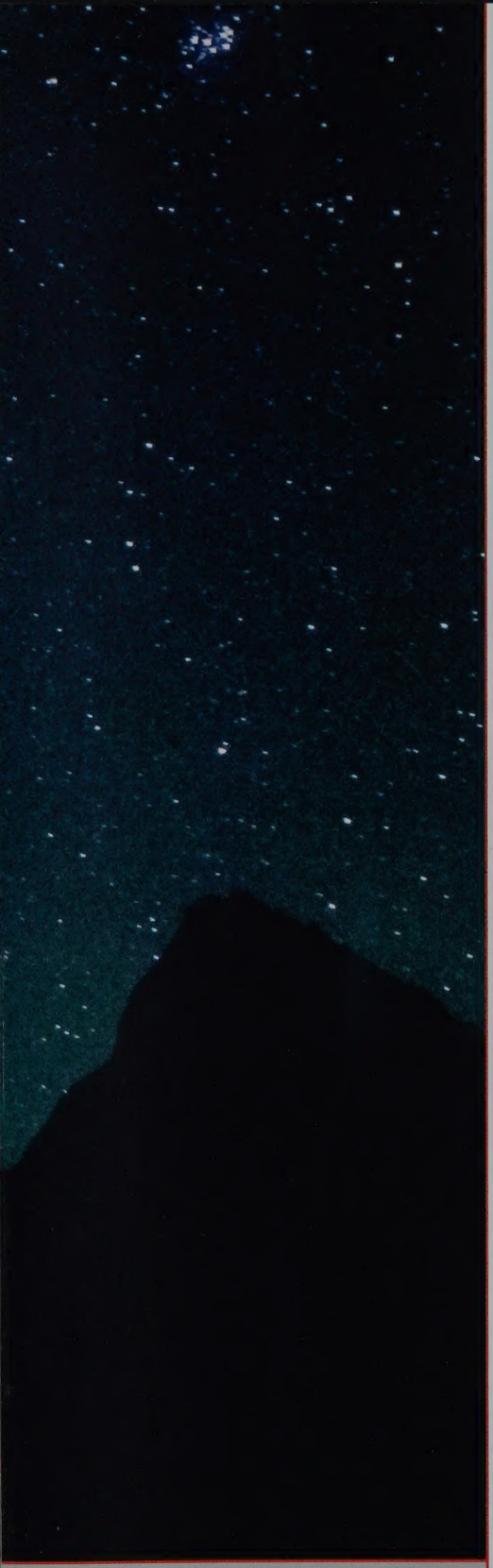

NIGHT LIGHTS A starry sky spreads out over Glacier National Park. See more big sky spectacles starting on page 22. Photo by Steven Gnam.

FRONT COVER Why are Montana's loons thriving even as more people flock to lakes? Find out on page 36. Photo by Donald M. Jones.

Montana Outdoors

JULY–AUGUST 2011

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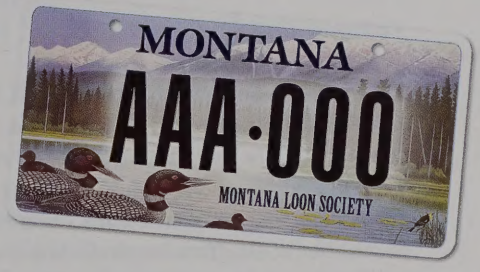

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It clicked

"The Land That Time Forgot" (March-April) was the best, most understandable presentation of northwestern Montana's geologic formation I've ever seen. I've read several articles and heard presentations about the geology of our neck of the woods and remained puzzled all that time. Then I read your article and it finally made sense.

Ron Cox
Seeley Lake

WHAT ARE WEST COAST RAINFOREST CREATURES DOING IN NORTHWESTERN MONTANA?
THE LAND THAT TIME FORGOT
STORY BY BEN LONG
PHOTOS BY DAVID HERASIMTSCHUK

What photos!

For the past few years, our family has enjoyed *Montana Outdoors*, especially the photos. Our favorites in this issue (May-June) were the amazing ones showing the mother mountain goat and her kids crossing the raging stream. Can you tell me more about the photographer?

Mary Linehan
Lindstrom, MN

Photographer Sumio Harada, of West Glacier, was born in Japan. He tells us that his university studies of the Japanese serow, a cousin of the mountain goat, led him to become a wildlife photographer. A permanent resident of the United States since 2005, Harada spends much of his time in nearby Glacier National Park photographing alpine wildlife. His images have also been published in National Geographic *and* National Wildlife *and earned him an award in Japan as a distinguished photographer of the year.*

In defense of hunting

I occasionally see letters to *Montana Outdoors* denouncing hunting. In response I must point out that managing our wild game is the only way native wildlife can survive the encroachment of civilization on their habitat. Hunting is an effective management tool used in maintaining wildlife numbers at sustainable levels while protecting wildlife from overpopulation. Humans have always been hunters. Hunting is part of our history and is every bit as valid today as it was in prehistoric times. Hunting is well regulated by laws, seasons, and quotas and is thereby insulated from abuses of the past, when entire species were hunted to extinction or nearly so.

Michael R. Clark
Billings

Bird hunting lover

I've enjoyed your magazine for years and especially look forward to the fall hunting season issues. Please consider more articles on bird hunting.

Ken Monroe
Spokane, WA

An article we're working on now for the September-October issue explains how Montana's Upland Game Bird Enhancement Program has been energized in recent years to improve habitat and hunting opportunities for pheasants, sharptails, and other upland game birds. Also in that issue: a guide to hunting mountain grouse.

Price increase backlash

I want to thank Montana Fish, Wildlife & Parks and the fine people of your state for saving me hundreds of dollars by increasing the cost of the nonresident elk combination license to $812. After I received notice of the increase, I made up my mind that you don't want nonresidents in your state—just our money. I promise that when I travel to Idaho to hunt elk I'll do everything I can to spend the least amount possible when driving through Montana. Also, I'm not renewing my subscription to *Montana Outdoors*, which I have received for the past 20 years.

> "I promise to spend the least amount possible when driving through Montana."

Warren Whitesel
Mill Hall, PA

Please cancel my subscription to *Montana Outdoors*. I have subscribed for a long time—maybe since you began—but I can't in good faith keep paying you money when FWP has jacked up the cost of the nonresident combination license so high. I know that charging nonresidents more for hunting and fishing licenses is common. In Wisconsin it costs a resident $20 to fish, while a fisherman coming here from Illinois pays $50. I understand that nonresident rates are market based, unlike resident license fees, which are kept low because of political pressure by resident hunters and fishermen. But at some point a state goes too high with its nonresident licenses. There's a backlash and you end up seeing fewer nonresident hunters. I think that's the case with you and your new nonresident elk license price increase. I'm not paying for it or your magazine.

Paul Bauer
Eau Claire, WI

Why the early gift renewal?

I bought a gift subscription for my brother in May. Then here comes a letter from you in July asking if I want to renew. That seems too soon.

Rodney Foreman
Sacramento, CA

It may seem odd, but we send out all gift subscription renewal notices in late summer—no matter when someone bought the gift subscription. That saves us money and helps keep the price of subscriptions as low as possible. Most Montana Outdoors *gift subscriptions are for Christmas. To ensure gift recipients don't miss a single issue, we start sending renewal notices several months ahead of the holidays. It would be too expensive to send every gift renewal notice three months before the subscription expired.*

Write to us

We welcome all your comments, questions, and letters to the editor. We'll edit letters as needed for accuracy, style, and length. Reach us at Montana Outdoors, P.O. Box 200701, Helena, MT 59620-0701. Or e-mail us at tdickson@mt.gov.

A Lively Legislative Session

At no time do Montanans express their feelings about fish, wildlife, and state parks management more strongly than when the legislature convenes in Helena every other year. The 62nd legislative session was no exception.

Here is a list of the major categories of legislation affecting this department, various bill proposals, and eventual outcomes:

Bison: Several bills that failed to become law would have made it harder for the state to move bison and create areas with wild bison. The governor did sign a bill that requires FWP to develop a management plan before translocating any bison to a new site.

Wolves: Eleven bills involved wolves or predator control. One failed bill would have directed FWP to use hunting license revenue to help fund the U.S. Department of Agriculture Wildlife Services for killing wolves that prey on livestock. Another that did not become law would have made it legal to kill any wolf, for any reason, on private land—putting wolves back on the endangered species list. Two bills signed by the governor direct FWP to obligate $900,000 each year for wolf management, require the department to use all wolf license revenue for wolf monitoring and control, and retain the department's existing regional wolf specialist positions.

Land acquisition and use: Several bills would have prevented FWP and other state agencies from acquiring more wildlife management areas, fishing access sites, and other public lands. One that did become law, as an attachment to the state budget bill, prevents FWP from acquiring any new fishing access sites larger than 5 acres for the next biennium. One bill the governor vetoed would have required that 50 percent of all Habitat Montana money go only to maintaining existing wildlife management areas, rather than the current 20 percent.

State parks funding: This bill, signed by the governor, increases the voluntary motor vehicle registration fee for state parks from $4 to $6. It also allows Montanans who don't use state parks the option of permanently opting out of the fee.

Missouri Breaks archery: Several bills that didn't pass were meant to undo Missouri Breaks archery regulations established in 2008 and prevent similar decisions in the future. The 2008 regulations restricted the number of archery elk licenses in the famous Missouri Breaks region. The FWP Commission announced after the session it would revisit that decision and put more emphasis on explaining future decisions.

JOHN JURACEK

A bill aimed at weakening the popular stream access law attracted more than 300 angry anglers in opposition.

Trapper education: One bill would have required new trappers to take an education course. This was the third session that legislation like this was proposed and the third time it failed.

Stream access: A bill aimed at significantly weakening Montana's popular stream access law attracted more than 300 angry anglers in opposition. The bill did not pass.

FWP Commission authority: Several bills that failed were aimed at reshaping the commission's authority. For instance, one would have required a detailed study of economic impact and other factors before the commission could make some decisions. Another bill would have given the legislature authority to set permit quotas in the Elkhorn Mountains.

Several other bills you may have read about that did not become laws:

- One would have allowed spears to be legal hunting weapons.
- Another would have prohibited game wardens from citing anyone who illegally killed a wolf.
- Several so-called federal "nullification laws," such as one declaring the Endangered Species Act unconstitutional and invalid in Montana, would have cost the state hundreds of millions of dollars in highway and other federal funding. (The ESA-nullification bill would have also criminalized state employees who study the effects of proposed development on grizzly bears and other threatened or endangered species.)

One thing FWP heard loud and clear during the past session was that we must do a better job of explaining to the public what this agency does and how that work benefits them. It's a reminder of why this department's public information activities continue to be important. Complete and accurate information is essential for sound and wise legislation. It's also the foundation of this department's efforts to manage and conserve Montana's fish, wildlife, and parks.

—**Joe Maurier,** Montana FWP Director

An FWP biologist stocks genetically pure cutthroat fingerlings in Sage Creek after the removal of all non-native trout.

"You can't help but feel good about restoring a part of Montana to how it originally was."

Cutthroats Return Home to the Pryors

One day last fall, eight-year-old Ayden Richau skipped school. The Billings third-grader had a great excuse: He had been invited to help FWP fisheries biologists put cutthroat trout into the stream below his grandfather's cabin in the Pryor Mountains.

That day of fish stocking culminated seven years of paperwork and planning that turned Sage Creek from a brook trout stream into the native cutthroat trout stream it once was.

Mike Ruggles, FWP fisheries biologist in Billings, says that half a year later, those stocked cutthroats are likely faring well. "Because the fish don't have much competition for food and space, we should have some great survival rates," he says.

The restoration project covered a 30-mile lacework of spring-fed seeps and trickles that join into rivulets, ponds, and tributaries that feed Sage Creek's main stem. The crystal-clear stream meanders through cow pastures and brushy riparian draws on its way south toward Wyoming's Shoshone River.

Before European settlement, many of the area's free-flowing streams and rivers were populated by westslope cutthroat trout. But during much of the 20th century, non-native rainbow trout, brook trout, and brown trout were stocked in lakes, creeks, and rivers throughout Montana. According to early newspaper accounts, when a train car carrying tanks of brook trout from hatcheries back east arrived at Hardin in the early 1900s, residents were encouraged to pick up buckets of fish and introduce the trout to waters throughout the region. At around the same time, state workers planted the first hatchery rainbows in Sage Creek. Later FWP added rainbows to Sage Creek nearly every year from 1953 until 1983, when the state stopped stocking fish into streams.

In many places, the transplanted trout were too successful. They often outcompeted native cutthroats, which eventually disappeared. In places where both cutthroats and rainbows still coexisted, they interbred, leaving hybrid crosses rather than pure-strain cutthroats.

HOME WATERS Stream restorations like the one on Sage Creek are giving westslope cutthroats east of the Continental Divide a fighting chance.

Ruggles says restoration projects like the one at Sage Creek help prevent westslope cutthroat trout from becoming endangered. More than 90 percent of pure-strain cutthroat trout range in Montana has been lost because of hybridization and habitat degredation. Any further loss could lead to listing the species as federally threatened or endangered. The listing would severely limit sport fishing and other activities along existing cutthroat streams, as has been the case with bull trout. "No one wants that—not anglers, not homeowners, not ranchers, and not FWP," Ruggles says.

FWP restored Sage Creek in part because the stream is isolated from water containing rainbow and brook trout. As it flows out of the Pryors, the creek disappears into gravel sinks southeast of Bridger, then reemerges before reaching the Shoshone River. That prevents rainbows from swimming upstream from the Shoshone and hybridizing with restored cutthroats.

The U.S. Forest Service, Bureau of Land Management, Bureau of Indian Affairs, Crow Indian Tribe, and dozens of pri-

vate landowners also took part in the project. Each entity had to assess how the restoration would affect where Sage Creek and its tributaries cross their lands. In the end, no one objected to the project and all parties helped out with the work, Ruggles says.

The next step was to remove all non-native trout from the 30 miles of streams and tributaries. During four days in early September, Ruggles led a crew of state, federal, and tribal biologists and technicians who sprayed and dripped rotenone into any water capable of holding fish. The chemical kills fish and other gill-breathing animals but does not affect insect eggs, allowing aquatic invertebrate populations to quickly recover.

Next, FWP stocked the waters with native cutthroats. The 5-inch-long fish were raised in state hatcheries from cutthroat eggs taken from nearby Goose Lake, which holds a pure cutthroat strain. In late September, an FWP tank truck loaded with 4,500 cutthroat fingerlings arrived at a pool on Sage Creek. There, Ayden Richau poured in the ceremonial first bucket of fish. Fisheries technicians stocked the remaining cutthroats in ponds, riffles, and pools along Sage Creek and its major tributaries. By that afternoon, Sage Creek had become Montana's newest in a string of restored cutthroat trout streams.

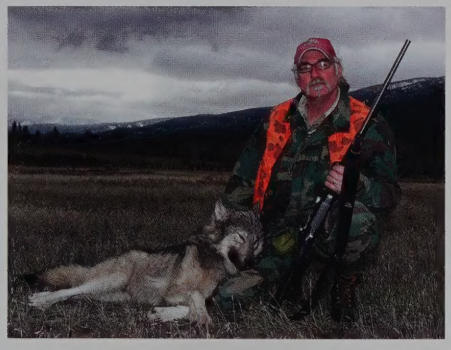
"This was a satisfying project for a number of reasons," says Ruggles. "We had terrific cooperation from landowners and other agencies. And you can't help but feel good about restoring a part of Montana to how it originally was."

— Bob Gibson, FWP regional Information and Education Program manager, Billings

The moose is Montana's largest member of the deer family, with bulls averaging 800 to 1,000 pounds. Big as they are, however, Montana's Shiras (or Yellowstone) moose subspecies are puny compared to the Alaskan (or Yukon) subspecies, which weigh 1,200 to 1,600 pounds. Just as Alaska grizzlies outweigh ours in large part because of their rich salmon diet, Alaskan moose have massive bodies and antlers because of abundant shrubby willows, the animal's preferred food. While the antler spread on a mature Montana bull moose can run about 45 inches, an Alaskan bull moose can produce antlers 65 to 75 inches across.

Congress delists wolves in Montana and Idaho

Federal agencies and federal courts couldn't agree on whether wolves in the Northern Rockies should be on the threatened and endangered species list. So Congress intervened.



A Hamilton hunter with a wolf shot during Montana's first hunt in 2009. Recent congressional action will allow Montana to hold its next season in fall 2011.

In April, lawmakers in Washington, D.C., passed a budget bill that included a bipartisan rider crafted by Montana Senator Jon Tester and others that delists wolves in Montana, Idaho, and parts of Oregon, Washington, and Utah. "The fact is, after years of lawsuits, the delisting got stuck in unacceptable gridlock, acrimony, and dispute," Secretary of the Interior Ken Salazar told reporters in early May. "It was consuming resources that could be spent recovering other species."

Governor Brian Schweitzer called the congressional action a "common sense measure that will ensure good wolf management through Montana's existing plan, which allows for a healthy number of wolves and safeguards the interests of ranchers and sportsmen."

Joe Maurier, FWP director, says he is "thankful that we can go back to managing wolves under Montana's highly regarded wolf conservation and management plan."

Delisting allows Montana to manage wolves as it does bears, mountain lions, and other wildlife species guided by state management plans, administrative rules, and laws. The FWP Commission recently proposed a 2011 fall wolf hunting season with an overall harvest quota of 220 wolves across 14 wolf management units. Biologists estimate that the new quota—combined with wolves removed for harassing wildlife and new pups added to the population—will lower the estimated 2010 population of 566 wolves to 425 wolves (a 25 percent reduction).

As a result of the wolf's success in the Northern Rockies, the U.S. Fish and Wildlife Service had delisted the wolf in Montana and Idaho twice since 2008. Each decision was successfully challenged in federal court, placing the wolf back on the federal list of endangered species. The congressional budget bill rider negates the federal court's rulings.

Learn more about wolf populations and management at fwp.mt.gov (click "Montana Wolves").

CLOCKWISE FROM TOP LEFT: BOB GIBSON/FWP; PUBLIC DOMAIN; KENTON ROWE; CHUCKNGALEROBBINS.COM

JEREMIE HOLLMAN

An Old Friend Comes To Town

Though tough on birds and bird feeders, the spread of eastern fox squirrels across Montana gives some of us a glimpse of places we once called home. By Dave Carty

ONE DAY in the early 1990s, I came upon an animal I had not seen since I was a boy. A friend and I had stopped at a farmhouse in Carbon County to ask permission to hunt. We found precious few of the Hungarian partridge we'd been hoping to see, but the cottonwoods around the farm were alive with eastern fox squirrels.

Like a lot of Midwestern kids, I grew up hunting fox squirrels, using anything my dad would let me shoot: first a bow, then a shotgun, and finally my own single-shot .22. The wary, keen-eyed squirrels were challenging to hunt and tasted great dredged in seasoned flour and sauteéd in butter. When our family moved west when I was 15, I assumed I'd left fox squirrels behind. The only tree squirrels in Montana were the little red (pine) squirrels and northern flying squirrels, neither of which interested me much.

Years later, seeing those fox squirrels along the Yellowstone River Valley transported me back to my boyhood days in southern Iowa. It also made me wonder: What were they doing there?

Fox squirrels are not native to Montana. They originally ranged from states along the Mississippi River east to the Atlantic Ocean. But over the past half century, the energetic rodents have been moving west—some naturally and others with a little human help.

Fox squirrels entered southeastern North Dakota from Minnesota in the early 1930s, then slowly moved west along wooded river and stream corridors. From there they migrated into eastern Montana up the Missouri and Yellowstone drainages. The squirrels I saw that day likely had been working their way west along the Yellowstone. But in other areas of Montana—notably Helena, Great Falls, Hamilton, and Missoula—fox squirrels migrated less naturally.

Kristi DuBois, Montana Fish, Wildlife & Parks wildlife biologist in Missoula, says she's "fairly certain" fox squirrels were imported into Great Falls in the early 1990s by a fellow originally from Wisconsin. Kerry Foresman, professor of wildlife biology at the University of Montana, says fox squirrels probably reached Missoula the same way. "Apparently there was a physician in the 1960s who lived in the Midwest, really enjoyed fox squirrels, and had property here in Missoula," he says. "When he came out one summer, he brought a bunch of squirrels with him and let them outside to run around in his yard." Because fox squirrels produce two litters of two or three young each year, it didn't take long for a thriving population to develop in the Garden City.

Another way fox squirrels may reach Montana towns is by train. "We've seen it with opossums coming into the state," says Foresman. "Small mammals jump onto trains or other vehicles heading across Montana. Squirrels once built a nest under the hood of my truck, and I didn't know it until I got 50 miles down the road and they jumped out."

The eastern fox squirrel is North America's largest tree squirrel. In Montana it weighs 1.5 to 2 pounds (four to six times as much as a red squirrel). It has grayish grizzled body fur, with an orangish tint in the tail and feet and pumpkin-colored belly fur. The reddish-orange coloration inspired the common name fox squirrel and helps differentiate the species from gray squirrels—another non-native animal imported into Great Falls and a few other cities.

Fox squirrels live and nest in old trees such as cottonwoods. The omnivores feed on corn, tubers, plant buds, bird eggs, grasshoppers, and even mushrooms.

Though natural predators such as hawks and owls keep them from overpopulating, fox squirrels can cause problems. They raid bird feeders and eat bird eggs and hatchlings (one reason it's now illegal to release squirrels and other non-native animals into Montana). Foresman says that in Missoula the interlopers have completely displaced native red squirrels, which have moved back into the pine forests where they originated. FWP offices in Missoula, Great Falls, and Bozeman regularly receive complaints from homeowners about fox squirrels invading bird feeders, attics, sheds, and garages.

Despite causing occasional problems, fox squirrels are much beloved by many Montanans who enjoy watching the lively animals chase each other up and down trees and across city parks.

A few years ago I watched a fox squirrel tightrope-walk across a telephone wire in the middle of Bozeman, where I now live. I'd seen fox squirrels in Livingston a few years earlier, and had been wondering when they'd make it over Bozeman Pass. That squirrel was probably a traveler, an animal whose family origins were hundreds of miles away to the east but for whatever reason had decided to make Bozeman home—which, come to think of it, sounds a lot like me.

Learn how to live with eastern fox and gray squirrels at fwp.mt.gov/wildthings/livingWithWildlife/

Dave Carty of Bozeman is a frequent contributor to Montana Outdoors.

SILENT SLURPER Bats drink on the wing, skimming over the water surface while taking a quick sip. Bats that live in Montana's arid regions, such as the pallid bat shown here, must constantly replace vast amounts of water lost to evaporation from the surface of their wings.

PHOTO BY JOE MCDONALD

Going to Bat *for* Bats

Why these remarkable winged mammals deserve more public support and scientific study. By Tom Dickson

It's not easy being a bat. The winged mammals have long been reviled as symbols of evil and witchcraft. Bats are feared for their silent, erratic nighttime flight, otherworldly appearance, and mysterious movements to and from underground roosts. Bats have been accused of attacking people, drinking human blood, and spreading rabies. Even scientific journals often depict bats open-mouthed in what appear to be menacing shrieks.

Yet the poor public image of bats may be the least of their problems. Bats must survive the loss of large trees and other roosting sites, disturbances by vandals, and lung damage caused by wind turbines. To make matters worse, they now face the threat of a mysterious disease wiping out colonies in northeastern states—and spreading west.

Given all they are up against, it's surprising to learn that bats are among the world's most successful species. "Bats are physiological marvels," says Bryce Maxell, interim director of the Montana Natural Heritage Program. Bats are the world's only flying mammals (flying squirrels, Maxell explains, only soar as they fall). Like grizzly bears, bats hibernate, and, like whales, deploy sophisticated sonar to navigate and find food. Because they occupy an ecological niche—the night sky—that other mammals and most birds don't fully use, bats have multiplied and evolved over the past 50 million years to become among the most abundant and diverse animals on the planet. ▸▸

Bats are characterized by their serrated wings, which resemble bits of broken umbrella. Oversized hands with flat, flexible finger bones make up the main wing structure. (Bats' scientific order name, Chiroptera, is Latin for "hand wing.") Attached to the fingers, arms, and body is a thin, elastic skin membrane that also connects the legs to the tail. In flight, most bats feed by snatching insects in their mouth, though some use a wing or the tail membrane like a baseball mitt to nab prey in midair. Their fluttering flight—which gave rise to the notion that bats are crazy, or "batty"—comes from the animals' attempts to catch flying insects.

Contrary to myth, bats see well, but they navigate at night with a sophisticated sense of hearing. Bats have evolved to thrive in darkness, most likely to avoid hawks and other daytime raptors. They produce a constant stream of high-frequency calls from their vocal chords at decibel levels equal to a jet engine's. "Bats seem quiet, but they are actually making a huge racket we can't detect because we don't hear the high frequency sounds they emit," says Maxell. With its large and highly developed ears, a bat picks up sound waves bouncing back off a bridge abutment or spruce bud moth and then—based on the time it takes for the sound to return—determines the object's location and, for flying insects, the direction and speed of movement.

> "When their roosts are wrecked, bats may have a tough time finding another suitable site."

Though they look somewhat like flying mice, bats are not rodents and are more closely related to shrews and moles. Of the roughly 1,000 bat species worldwide, 15 occur in Montana. Some, like the Townsend's big-eared bat, reside here year round, while others migrate south to warmer states and Mexico each fall.

When not flying, bats roost in caves and attics, under bridges, in rock outcrops, and between the loose bark and trunk of old, large trees. They hang upside down—"like rows of old rags," wrote one poet—with toes hooked into cracks, high above predators. Bats use many different sites: day roosts for sleeping, night roosts for resting and digesting prey, female maternity roosts for rearing young, and winter roosts (or hibernacula) during cold months.

Ruined roosts

Despite their remarkable biological adaptations, bats quickly die out when their roosts are degraded or destroyed. While bats gain habitat from new bridges, mines, and buildings, they lose roosts whenever abandoned mines are sealed, old homes are torn down, or large trees are logged or burned. "Some roosts support colonies that have lived there for decades," says Maxell. "When the roosts are wrecked, bats may have a tough time finding another suitable site." For instance, wintering bats use caves and caverns where temperatures remain just above freezing. "Anything colder and they freeze to death," Maxell says. "Anything warmer causes them to burn fat reserves, and they basically starve during winter."

Human disturbance also can ruin bat roosts. Experienced recreational cave explorers, known as cavers, avoid bothering bats and help protect cave environments. But some caves, caverns, and mines attract vandals who light fires, set off fireworks, and paint graffiti on walls. Bats permanently leave roosts and avoid sites that have too much commotion.

Wind turbines can be deadly to bats, primarily tree-roosting species such as the

Tom Dickson is editor of Montana Outdoors.

BATS in the mainstream

Bat folklore has long been associated with the supernatural and, starting in the 19th century, the vampire Dracula. Bats are also the mascot of Gotham City's famous superhero. Only by overcoming his childhood fear of bats was the Caped Crusader able to summon the courage to fight evildoers intent on destroying the world. Listed here are other examples of bats in the mainstream:

The U.S. Postal Service released its American bats stamp series in 2002. The set featured a red bat, pallid bat, spotted bat, and leaf-nosed bat.

Congress Bridge in Austin, Texas, is home to 1.5 million Mexican free-tailed bats. Each year 100,000 tourists gather to watch the bats emerge at dusk to feed.

silver-haired bat and hoary bat. The animals apparently die of lung damage after being sucked into a low-pressure area immediately behind the blades—a condition known as barotrauma. A study in 2006-07 estimated that more than 1,200 bats were killed during fall and spring migrations at a 90-turbine wind farm near Judith Gap. Another area with possible high bat mortality is along the Rocky Mountain Front in southern Alberta, home to thousands of wind turbines.

A new threat to Montana bats may be white-nose syndrome (see sidebar, page 14), which has wiped out colonies in New York and other eastern states. The disease is so devastating that biologists predict the Northeast's population of little brown bats could become extinct within the next 20 years. Though white-nose syndrome may never reach the Rockies, biologists throughout the West have begun bracing for its arrival. "We're hoping for the best but preparing for the worst," says Kristi DuBois, Montana Fish, Wildlife & Parks wildlife biologist in Missoula.

Because bats produce litters of only one to two pups per year, "if something happens to a colony or population, it can take a long time to recover," says Paul Hendricks, Montana Natural Heritage Program zoologist. Pregnant and nursing Townsend's big-eared bats hang out in small, dense colonies in Montana's relatively small number of warm cave and cavern environments such as Lewis and Clark Caverns. That makes them especially vulnerable to roost loss, disturbances, and disease.

Fewer bats would result in far more insect pests damaging crops, ruining picnics, and spreading disease. In just one night, a single little brown bat will eat 4,000 mosquitoes that, besides annoying campers, can carry West Nile Virus. Maxell notes that bats also help control insect pests in western Montana forests and the Flathead Valley fruit-producing region.

DEBRA KRANTZ

CAVE VISITORS Experienced cavers protect caves, disinfect their clothing and equipment to avoid spreading white-nose syndrome, and take pains to avoid bothering bats. Cave vandals, on the other hand, ruin bat roosts with graffiti, fire building, and other disturbances.

Learning a little

The scientific information that wildlife biologists need to help bats is in short supply. Especially lacking are locations of roosting sites for the state's six species of concern: spotted bat, fringed myotis, eastern red bat, pallid bat, hoary bat, and Townsend's big-eared bat. "Very few caves in Montana have been inventoried, and we're only now learning to what extent bats roost in rock outcrops, in talus slopes, and under bridges," says Hendricks. "We don't even know what roosting habitats to protect."

Bats are tough to study. They hide deep in crevices, fly at night, and produce calls mostly inaudible to humans. For years biologists had only a sketchy sense of bat distribution in Montana. That began to change in the 1990s when new ultrasonic technology allowed scientists to decipher bat calls. Researchers deploy the Anabat and Sonabat echolocation systems to record ultrasonic bat

Fruit bats rescued during severe storms in early 2011 by the Australian Bat Clinic became an international Internet sensation when photos of them went viral. Wrote one blogger: "Who knew bats could be adorable?"

Rob Mies, director of the Organization for Bat Conservation, captivates late night TV host Conan O'Brien with a tame fruit bat.

LEFT TO RIGHT: 365THINGSAUSTEN.COM; USPS; NBC; AUSTRALIANBATCLINIC.COM.AU

sounds. These are then translated by computers into low-frequency chirps, burrs, and chatters audible to humans. In addition to identifying species, the technology allows experts to see what bats are doing, such as when the animals make a "feeding buzz" while locating and eating prey.

Biologists also capture bats along streams and at cave and abandoned mine entrances using tiny-mesh nets. Hendricks and other researchers put up the "mist nets" at dusk and leave them standing for a few hours. They measure each captured bat and determine its age, sex, and reproductive status. "Netting tells us where bats are at night, but even more important is figuring out where they are roosting during the day," says Hendricks. That requires fitting bats with transmitters and following them with radiotelemetry equipment. Because the equipment is expensive, Hendricks adds, very little radiotelemetry work has been done on Montana bats.

Despite a chronic lack of funding, some bat conservation work is taking place. Hendricks and other bat advocates credit the U.S. Forest Service, Bureau of Land Management (BLM), and U.S. Army Corp of Engineers for funding several bat surveys in caves and at hydropower dams. The Forest Service, BLM, and Confederated Salish and Kootenai Tribes have also installed "bat gates" at several abandoned mine entrances to restrict vandalism while allowing bats in and out. Maxell says he's heartened by new research showing that altering wind turbine operations during high-risk periods for bats significantly reduces fatalities. "We're hoping turbine owners will be open to making some minor modifications that will save bats—like reducing windpower production during summer in low-wind conditions when bats may be active in the area," Maxell says.

> "Bats are shy animals that try to avoid contact with humans whenever possible."

DuBois says one way ordinary people are helping bats is by protecting big trees and snags, especially those near water. "Another is by telling friends and family that bats are interesting and there's absolutely no need to be afraid of them," she says.

Loving what we understand

Yet fear of bats persists. Over the centuries the animals' silent, nocturnal habitats, fluttering flight, and odd appearance have spawned numerous unfavorable myths and legends. Shrouded in mystery, the cave dwellers are depicted in folklore and popular fiction as symbols of death, the underworld, and vampires. "People fear things they don't understand, and it's hard to learn about something that moves around silently in the dark," says DuBois. She has found that people are less afraid once they learn a few basic facts. For instance, many photographs show bats with their mouth wide open, teeth exposed. "That's usually because they're in

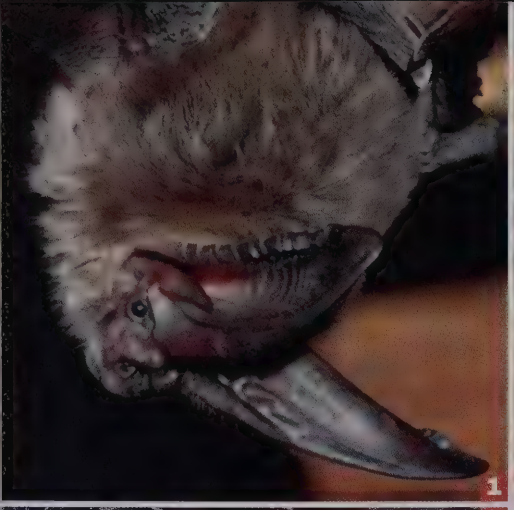
Learn more about bats

- **Bat Conservation International**
  Information on bat natural history as well as bat house construction plans, bats in buildings, bats and rabies, and a video with instructions on how to safely remove a bat from your home: batcon.org/
- **Montana State University**
  Information on bats in homes: http://animalrangeextension.montana.edu/articles/wildlife/Bats_Montguide.pdf
- **Montana Fish, Wildlife & Parks**
  Living with Wildlife: fwp.mt.gov/wildthings/livingWithWildlife/

BLADE RUNNERS Bats can die while, for reasons unknown, they chase the spinning blades of wind turbines. The rapid change in air pressure behind the blades causes blood capillaries in a bat's lungs to explode—a condition known as barotrauma.

USDOE

1. KRISTI DUBOIS; 2. ROBERT J. WESELMANN; 3. MERLIN D. TUTTLE, BAT CONSERVATION INTERNATIONAL (BCI); 4. ROBERT J. WESELMANN; 5. BCI; 6. BCI; 7. WES UNCAPHER; 8. BCI; 9. JOE MCDONALD; 10. BCI; 11. BCI



AMAZING FACES A bat uses its oversized ears to gather ultrasonic calls bouncing back off objects. Ear shapes differ based on the echolocation methods each species employs. For instance, the spotted bat (10) is a moth eater that uses sound frequencies lower than what the insects can detect. To hear its calls for navigation, spotted bats evolved to have bigger ears than many other species. Says Merlin Tuttle, founder of Texas-based Bat Conservation International: "If you think about it, bats are no stranger looking than elephants. But we are familiar with elephants, so we like them anyway."

Montana bats shown here: Townsend's big-eared bat (1), big brown bat (2), western small-footed myotis (3), silver-haired bat (4), eastern red bat (5), California myotis (6), long-legged myotis (7), hoary bat (8), pallid bat (9), spotted bat (10), long-eared myotis (11).

someone's hand and are scared to death," explains DuBois. Regarding the myth that bats fly into people's hair, DuBois points out that bats are shy animals "that try to avoid contact with humans whenever possible. Besides, why would any animal want to fly into someone's hair?"

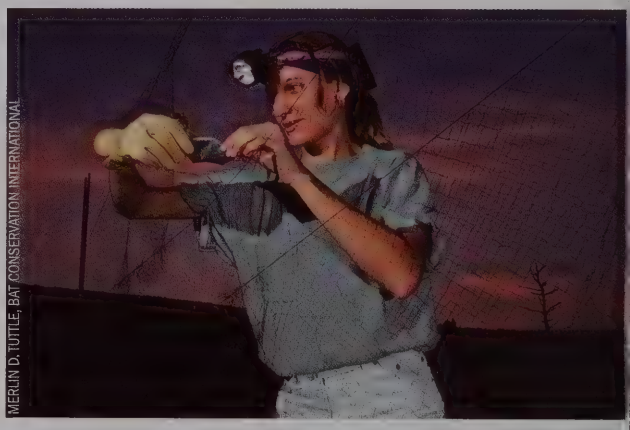
As for rabies, the Montana Department of Public Health and Human Services says bats pose a human health risk, but a small one. Less than one-half of 1 percent of wild bats carry the disease—a prevalence far lower than in skunks and foxes. In 40 years of surveying bats, Hendricks says he has been nipped only once, "by a bat I'd grabbed that was only trying to defend itself." He adds that he'd been previously vaccinated against rabies, a routine precaution taken by scientists who handle bats. According to the Centers for Disease Control, the best way for regular folks to be safe around bats is simple: Never touch one.

Bats occasionally cause problems. They sometimes roost in attics—warm, dry, dark environments that are ideal bat habitat. Homeowners sometimes hear bats moving and squeaking, and accumulated excrement and urine from large colonies can smell.

Yet even with their sullied reputation, bats may be getting a public makeover. DuBois notes that increasingly she hears from people who want bats removed from their house but left unharmed. "That's a big difference from 20 years ago," she says. "I think people are learning that bats are important Montana wildlife, like elk and eagles." Tom Forwood, naturalist at Lewis and Clark Caverns State Park, says bat education programs in schools have changed attitudes. "Kids aren't freaked out anymore. They say, 'We want to see bats. Bats are cool.'"

> "Kids aren't freaked out anymore. They say, 'We want to see bats. Bats are cool.'"

DuBois notes that few people these days still believe bats attack humans and suck their blood. In fact, many homeowners in Montana and elsewhere now put up outdoor bat houses to attract the mosquito eaters. Bats have even become tourist attractions. A bridge in Austin, Texas, is the summer home of a colony of 1.5 million bats. Each year roughly 100,000 tourists visit the bridge at dusk to watch the bats leave the roost to feed.



MERLIN D. TUTTLE, BAT CONSERVATION INTERNATIONAL

BAT TRACKERS Using mist nets (right), scientists capture bats that are identified and measured before release. Acoustic monitoring stations installed along streams (far right) record bat calls for later study. Though touching bats is discouraged by health officials, researchers take safety precautions such as routine rabies vaccinations.

Stay safe around bats

Like all mammals, bats can carry rabies, though relatively few do. Still, health officials say it's not wise to take chances:

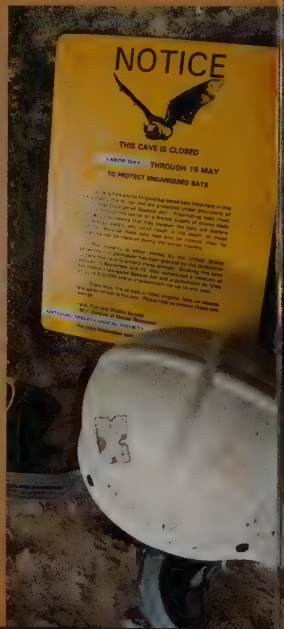
- Never handle a live or dead bat.
- Stay away from any bat that appears sick or is on the ground during daylight.
- If a bat accidentally gets into your house, leave doors and windows open so it can eventually fly out.

JESSE LEE VARNAL

Red Flags Raised over White-Nose Syndrome

In 2006 a caver in upstate New York was puzzled to find dozens of dead little brown bats, each with a white fungus on its nose. Since then, what is being called white-nose syndrome (WNS) has spread to 16 states and three Canadian provinces, killing more than one million bats. Bat colonies in the Northeast have declined by more than 70 percent, and many scientists predict the little brown bat will be regionally extinct by 2030.

Because the epidemic has arrived so suddenly, scientists are still figuring out exactly how the syndrome kills bats. One theory is that because the fungus seems to cause skin irritation, bats wake from their winter torpor more often than usual, burning up precious fat reserves and starving to death before insects emerge in spring. The fungus may also weaken bats' immune system, affect their blood pressure, or be outright lethal to the animals.



In 2010 the fun-

Bats will never replace grizzly bears, bison, or cutthroat trout on Montana's tourism brochures. And a state chapter of Myotis Unlimited won't be opening anytime soon. Yet bats may find plenty of support here. Montanans have a reputation for valuing and conserving wildlife of all types. If there's anyone able to learn about, support, and conserve these shy, fascinating, and unfairly maligned critters, it's us.

See live bats at the Second Annual Bat Week, August 15–20, at Lewis and Clark Caverns State Park. Events include daily programs and nighttime bat tours of the caverns. Appropriate for families with kids age five and older. For more information, call the park at (406) 287-3541.

MONTANA NATURAL HERITAGE PROJECT

MORE BAT FANS Populations of some Montana species like this Townsend's big-eared bat may be declining, though scientists say the lack of information makes it hard to tell for certain. One thing in bats' favor is growing public interest in bat behavior. Says one FWP state parks naturalist: "In the past seven or eight years I've noticed a real change in attitudes about bats, especially in kids."

JOE MCDONALD

gus was documented in Oklahoma, a jump westward of several hundred miles from confirmed locations. That led scientists to suspect the fungus was carried on the clothing of someone who had explored an infected cave then traveled west.

In Montana, representatives of state and federal agencies say they continue to monitor the spread of WNS and discuss ways to prevent it from infecting bats in the Northern Rockies. The U.S. Forest Service recently announced it may soon fund bat distribution surveys and training sessions on how to decontaminate clothing and equipment before and after cave and mine entry.

To give bats a fighting chance, state and federal conservation agencies are asking people not to disturb the animals when roosting. The Forest Service has issued caving equipment decontamination orders and recently announced the possibility of a permit-only entry system for national forest caves in Montana and other states.

Lewis and Clark Caverns State Park now requires visitors who have entered caves east of the Mississippi River within the past four years not to wear clothing or carry items from those visits into the caverns.

Chris Servheen, regional U.S. Fish and Wildlife Service coordinator for WNS, says the measures are meant to keep the fungus out of Montana and other western states and protect bats from unnecessary stress.

USFWS

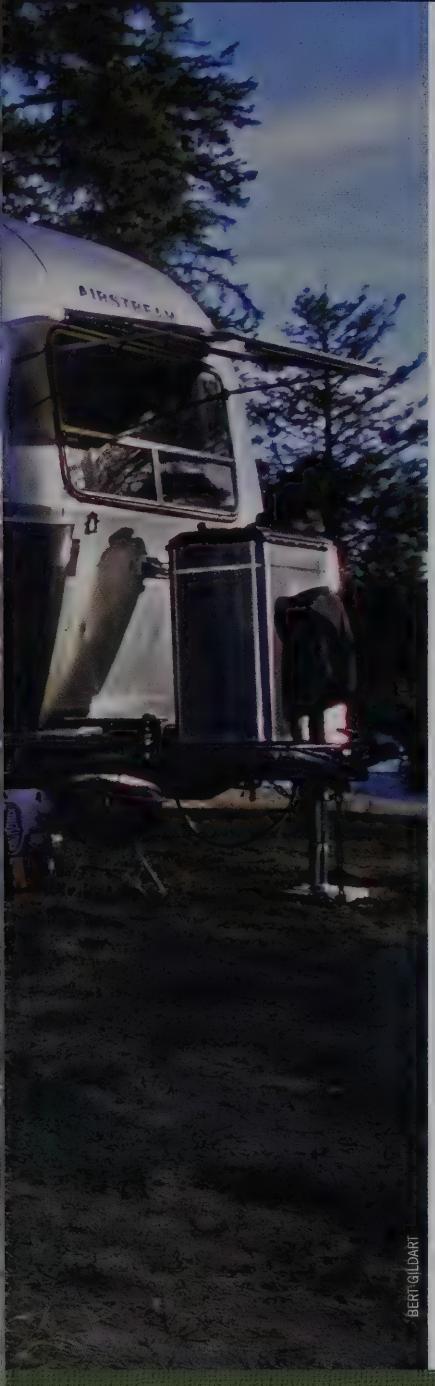
JONATHAN MAYS, MAINE DEPT. OF INLAND FISHERIES AND WILDLIFE

Wildlife biologists in Maine survey a cave for white-nose syndrome, which is wiping out bat colonies throughout the Northeast

Stop and Smell the

Slow down to get more from your campground experience this summer.

BY BECKY LOMAX



BERT GILDART

S'mores

JUST HANGIN' It's tempting to rush around Montana admiring one scenic site after another. Resist. Remember that you're on vacation. Find a great campsite, then set down roots for a few days. Kick back. Hang out. Build a fire. Even consider taking a nap—or two.

Pine needles and campfire smoke scent the air. The sunset sends a pale pink glow across the landscape. A stream gurgles nearby while, in the distance, a barred owl calls to its mate. Camping offers many ways to immerse your senses in nature. Unfortunately, too many people race through camping adventures in the same way they run through the grocery store—at high speed trying to fill their carts with a life list of experiences. Glacier: check. Flathead Lake: check. And so on.

There's nothing wrong with wanting to pack a lot into a camping trip, or visit as many sites as your vacation will allow. But during 35 years of camping throughout the Northern Rockies, I've learned that campgrounds offer a lot more than simply spots to set up a tent or park an RV. Campgrounds themselves can be destinations, offering plenty of the nature, relaxation, recreation, and scenery we seek while vacationing. Listed here are four simple tips for making your next camping trip more enjoyable, meaningful, and memorable, along with nine Montana campgrounds that anyone who loves camping won't want to miss.

BECKY LOMAX

EASY DOES IT Roasting a marshmallow exemplifies the benefits of slow camping. Toast it too quickly, and it's ruined. Take your time, and the classic campfire treat browns perfectly.

PUT DOWN ROOTS

1 Camping remains one of the most popular outdoor activities in Montana. In many places, more people are camping than ever. Glacier National Park reported a record number of visitors during July and August last year, its campgrounds filled with tents and RVs nearly every day.

Beat the crowds by arriving at popular campgrounds between 10 a.m. (the usual check-out time) and noon. Then—and here's the real tip—stay put for a few days. Rather

than rushing from campground to campground—arriving each evening after a long day of travel and then grubbing for the few remaining spots—put down roots and make one site your base. Use the time ordinarily spent setting up and dismantling camp to fully enjoy the camping experience. Sleep in. Read a book in the shade of a tree. Head to a nearby hiking trail or scenic vista.

Be sure to pick the right campground for your base (see my picks on page 21). A dusty facility next to a highway or a site littered with trash is no place to spend even one day. Look for campgrounds with hiking and bicycling trails, swimming and boating lakes, or fishing and kayaking rivers within walking distance of your tent or RV. And keep in mind that many campgrounds without recreational amenities, especially ones near any type of water, can still be great places to watch birds and other wildlife.

"Nature has a restorative effect to calm, soothe, and reset the attention of both kids and adults."

2 UNPLUG

Bring bug spray and sunscreen, but leave the electronics at home. I'm not being a Luddite. The whole point of camping for me is to leave my regular life—which includes e-mails, video games, TV, and the Internet—at home. In many campgrounds, RVers keep their generators droning on late into the night so they can watch television. How people choose to recreate is their own business. But if the main reason to camp is to enjoy and appreciate nature, I've learned that almost anything requiring electricity interferes. (The exception for me is a camera, which adds to my outdoor experience.)

As someone who often camps with youngsters, I know that leaving video games and MP3 players at home isn't the easiest sell to kids or grandkids—at first. But without electronics blanketing natural sounds, you and your family will begin to hear the sighing of wind through treetops, the call of nearby loons, or the mournful yips of distant coyotes—sounds kids quickly learn to love.

"Returning to the simpler sensory experience that nature provides can be soothing," says Heather Ristow, education director for the Montana Audubon Conservation Education Center in Billings. "Nature has a restorative effect to calm, soothe, and reset the attention of both kids and adults."

3 EXPLORE THE GROUNDS

If you pick the right campground, there's no need to drive off each morning to discover new and exciting things to see. You can find plenty of natural wonders simply by meandering around the campground or even staying put at the campsite.

Though they can't compare with what you'd see backpacking into the wilderness, many Montana campgrounds are packed with delightful natural features. Over the years I've spotted glacier lilies, morel mushrooms, golden eagles, and deer fawns. And because you're not driving from one tourism site to another, there's time to really look at wildlife, wildflowers, trees, and constellations. Bring along a few good field guides to help identify plants and animals.

Another way of squeezing more from a campground stay is to draw, describe, or photograph what you see. Time abounds to sketch pine cones, write about surrounding sounds and smells, or figure out all the different things your digital camera can do, like taking macro shots of wildflowers or long-exposure pictures of the pre-dawn sky.

Dusk and night are wonderful times to enjoy camping. Each evening I search for the best place near my campsite to watch the sun go down. Even without a good westward view, I'll find a spot to enjoy alpenglow lighting up a distant mountainside or the twilight sky reflecting in a lake. And then things get even better.

Most of our lives are spent indoors during darkness, but camping offers the chance to be outside at night. After the last marshmallow has been toasted and devoured, spend time around the campfire. Talk about what you saw that day, share stories, or play word games by the glow of dying embers.

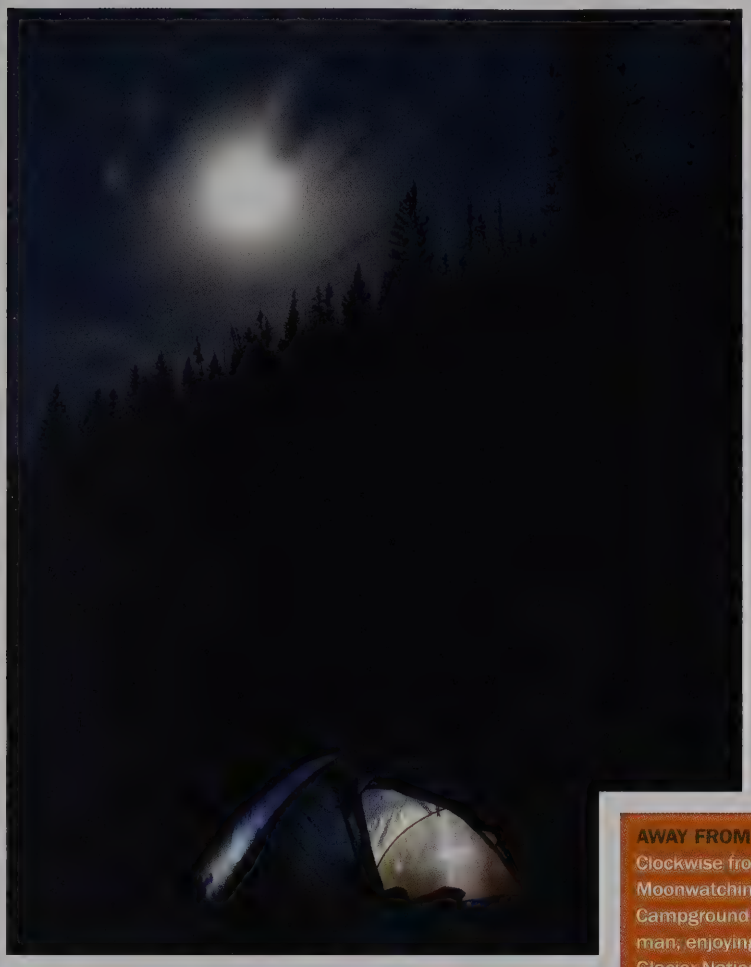
After dousing the fire, turn off flashlights and soak in the night sounds, gaze at stars, and stare at the moon. You don't need a telescope, but binoculars can definitely enhance the experience of watching a full moon rise or identifying Orion, Draco, Canis Major, and other famous constellations.

4 COOK, FAMILY STYLE

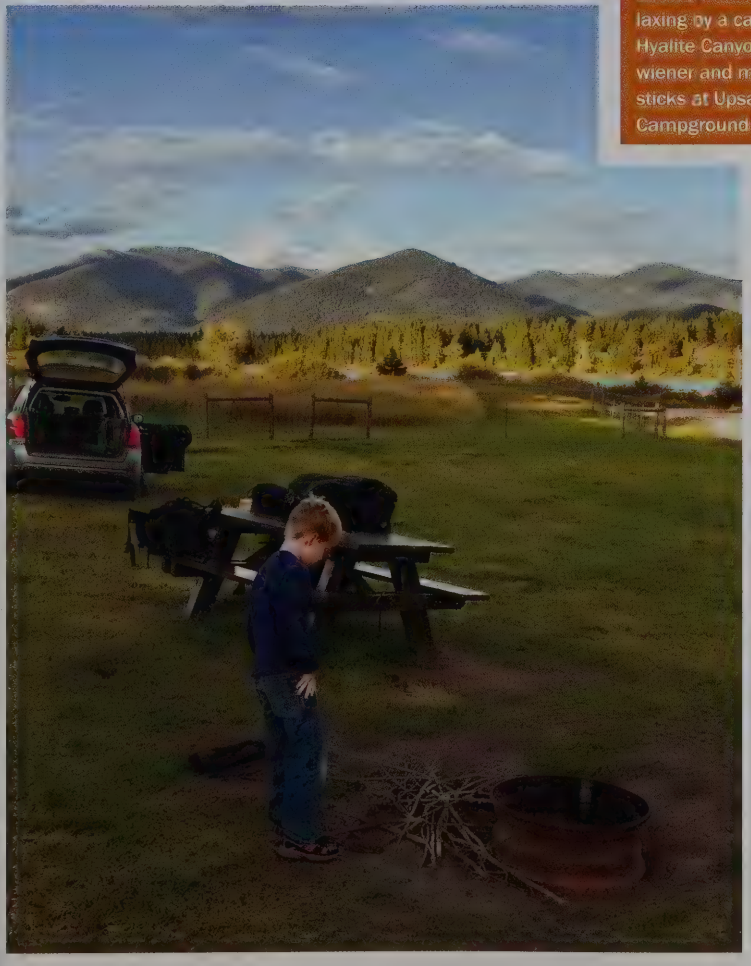
Camping can be even more fun when preparing and cooking food are added to the mix. Make dinner a time to experience different cooking methods, new foods, and even a little history. "Cooking on camping trips is a great way to involve the whole family. When done right, it can be very rewarding," says Lori Rittel, who grew up cooking outdoors as the daughter of a Montana backcountry outfitter. With her brother John, she also co-authored the

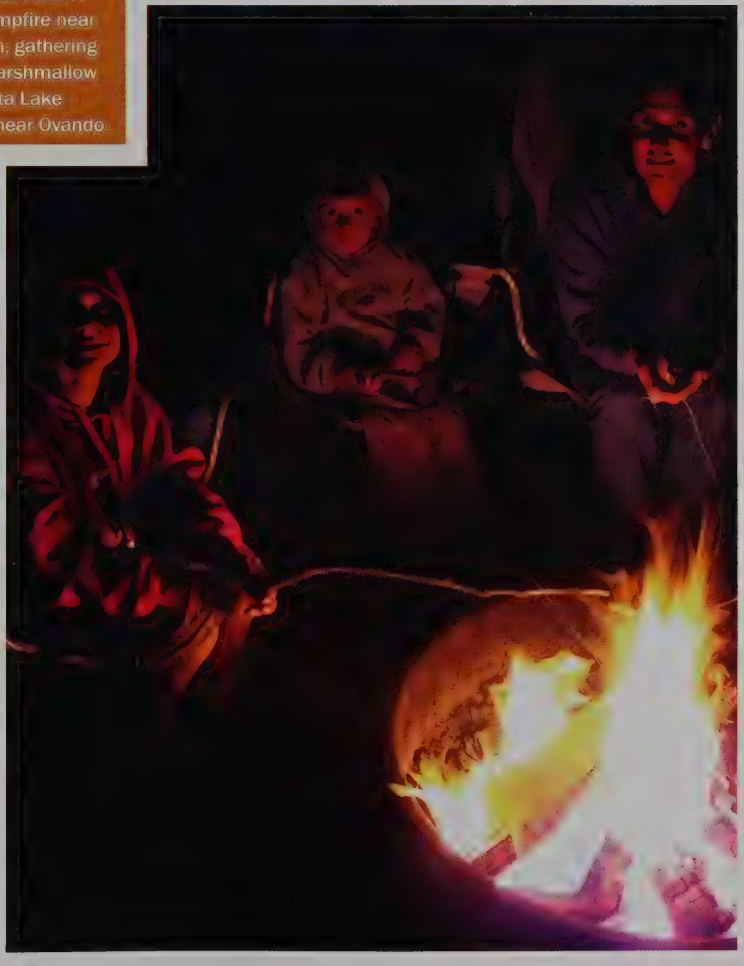
Becky Lomax, Whitefish, is the author of Montana, Wyoming & Idaho Camping (Moon Outdoors).

CLOCKWISE FROM TOP LEFT: WILDWESTPHOTOS.COM; BECKY LOMAX; JIM R. HARRIS; PAUL QUENEAU



AWAY FROM IT ALL
Clockwise from top left: Moonwatching at Langhor Campground near Bozeman; enjoying hot cocoa in Glacier National Park; relaxing by a campfire near Hyalite Canyon; gathering wiener and marshmallow sticks at Upsata Lake Campground near Ovando.





outdoor cookbook *Cooking Backyard to Backcountry*.

Rittel says everyone in the family can help prepare and grill meats and vegetables, cook stews in foil pouches, and bake foil-wrapped potatoes. Kids can roast hotdogs and marshmallows with little assistance. Campfire cooking tools can be as basic as roasting sticks, long tongs, leather gloves, and aluminum foil.

"Kids are like sponges. They want to learn, and they want to participate," says Rittel. "The best way to get them involved is to give them a task. Start them off by teaching them how to build the fire, or stir ingredients, or husk corn. Then expand the responsibilities from there."

When kids help out, meal preparation becomes more than just a fun family project. "Children involved in the cooking process are more likely to want to eat the final product, because they helped," says Rittel. "It's a great way to interest young children in foods they might otherwise reject."

Campfire cooking can even provide opportunities to teach kids a bit of pioneer history. "A lot of cooking methods, such as using a Dutch oven, were used long ago before kitchens," says John Rittel. Far too heavy for backpacking, Dutch ovens are ideal for car or RV camping. Made of heavy cast iron with a tightly fitting lid, these simple, portable cooking vessels have been used worldwide for centuries. After food is placed inside, coals are set around the sides and atop the lid to produce heat from all directions, as in a home oven. Campers use Dutch ovens to make stews, roasts, and casseroles as well as for baking biscuits, bread, and even cakes. "With no television or other distractions, you and your family can actually take the time to enjoy the cooking process and then sit down to a fabulous meal around the campfire," Lori Rittel says.

Just two words summarize the advice I have for campers: slow down. Stay in one place for a few days. Spend time hanging around the campsite. Take a few hours to cook dinner. Even if it's just for a weekend, a camping trip can rejuvenate your spirit and restore your soul—but only if you let it.

TOP TO BOTTOM: CASTIRONIDAHO.COM; JIM R. HARRIS; LINDA KELLY

GOURMET GRUB Cooking meals at camp—whether in a traditional Dutch oven or on a modern propane grill—forces you to slow down and savor the process of preparing food for yourself, friends, and family. After a good meal, there's nothing to do but stoke the fire, relax, and wait for the stars to come out.

9 Campgrounds Not To Miss

Montana is packed with great campgrounds. Here are nine I think every camper should visit at least once. Though most lack RV hookups, all contain plenty of scenery and recreation.

1 Avoid crowds in Glacier National Park by heading to **Two Medicine Campground**, where hiking trails rim Two Medicine Lake and climb to high passes. When the big lake is covered in whitecaps, paddlers and anglers can enjoy calmer waters on nearby Pray Lake. This is one of the few campgrounds in the world from which campers can spot distant black bears, grizzly bears, mountain goats, and bighorn sheep.

2 **Flathead Lake** is ringed by five small and secluded state parks: Big Arm, West Shore, Wayfarers, Yellow Bay, and Finley Point. All of the parks contain camping sites, water, and picnic areas. Flathead, the largest natural freshwater lake west of the Mississippi River, is known for its clean, clear water and is popular for swimming and kayaking.

3 **Big Therriault Lake Campground** defines quiet. The campground is next to Ten Lakes Wilderness Study Area in the Kootenai National Forest outside Eureka, at the end of a dirt road. Motorized boats aren't allowed on 45-acre Big Therriault Lake, so you can hear waves lapping the shore and an occasional loon. Hikers and horseback riders can choose from several routes that include alpine lakes, lookouts, and scenic high ridge traverses.

4 **Holland Lake Campground** sits under thick conifers in the Swan Mountains of the Flathead National Forest north of Seeley Lake. The site is popular with anglers, water-skiers, boaters, paddlers, and hikers. Trails starting at the campground lead to waterfalls, lakes, a lookout, and the Bob Marshall Wilderness.

5 In the Bitterroot National Forest, **Lake Como** offers two campgrounds—one for tenters and one for RVers. Spacious sites spread out under a deep forest canopy. The dam-controlled lake is best before mid-July for fishing, boating, swimming, and paddling. (After that, dam releases drop lake levels too low for some water recreation.) A hiking trail circles the lake into the Selway-Bitterroot Wilderness.

6 Set in the otherworldly badlands of far eastern Montana, just outside Glendive off I-94, **Makoshika State Park** offers campers great cycling, hiking, and, at the wonderful visitor center, dinosaur fossil gawking. The park contains 15 RV spots as well as six primitive tent sites that have spectacular sunrise and sunset views.

7 In the Lewis and Clark National Forest, hillside campsites above Gibson Reservoir make **Mortimer Gulch Campground** a great base from which to explore the Sun River Wildlife Management Area. Day hikers might see peregrine falcons, golden eagles, bighorn sheep, elk, and even grizzly bears at this popular entrance to the Bob Marshall Wilderness. Other activities include mountain biking, fishing, and boating (though paddlers need to be cautious of big winds).

8 **Cliff Point Campground**, set on Cliff Lake in the Gravelly Range of the Beaverhead-Deerlodge National Forest, contains campsites spread around a peninsula. Swimming is excellent in the lake's shallow turquoise waters and clean, sandy bottom. The site is quiet because motorized boats are not allowed on the lake. Campers might spot bald eagles and beavers, and a hiking trail climbs to an upper campground.

9 Tucked on Rock Creek at the base of the Beartooth All American Road in Custer National Forest near Red Lodge, **Greenough Lake Campground** loops through a pine forest dotted by boulders dropped by ancient glaciers. Reaching the tiny lake requires only a quarter-mile hike on a National Recreation Trail. Drive just a few miles on scenic dirt and paved roads to reach the vast Beartooth Plateau for hiking, mountain biking, fishing, and sightseeing.

—Becky Lomax

Two Medicine Campground in Glacier National Park tucks against Two Medicine Creek as it winds between two lakes.

BECKY LOMAX

The Spirit Soars

Montana is defined by its seemingly boundless troposphere. The nickname Big Sky State—which later morphed into Big Sky Country—was borrowed in 1961 (with the author's permission) by the Montana State Advertising Department from A. B. Guthrie's best-selling novel of the fur trade, *The Big Sky*. Half a century later, despite several new slogans (including the short-lived Montana: Naturally Inviting), the one extolling our expansive heavens still resonates.

The Big Sky moniker applies statewide, even though Montana's two halves couldn't be more different. In eastern Montana's prairies, it's the lack of view-blocking trees that reveals 360 degrees of horizon. In forested western Montana, the sky opens up only as you gain altitude, but upon reaching a mountaintop vista you can see all points of the compass.

The sky isn't big everywhere in Montana. Canoeing down the cottonwood-lined Yellowstone River, fishing the deep Gallatin Canyon, or hiking through Douglas fir forest in the Swan Range, often the only visible sky is straight overhead. It's the same obscured view you'd have in Michigan's North Woods or Boston's skycraper-dominated downtown. But in Montana you

Douglas Roane Farmland off Montana Highway 3 northwest of Billings

can climb out of a river valley onto the plain, or veer off a forested mountain trail to reach a rocky outcrop. Immediately a great expanse opens in all directions.

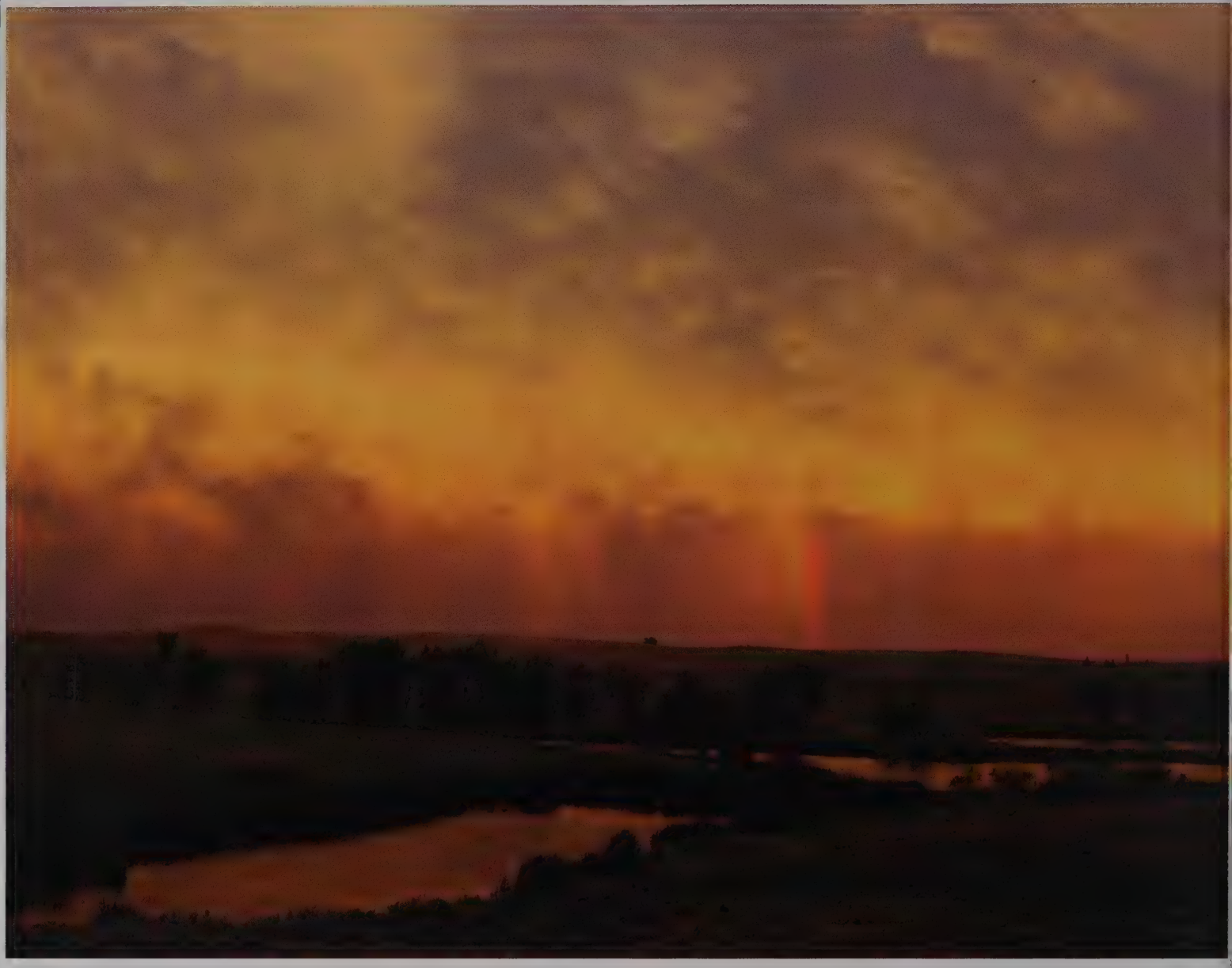
Stars and clouds expand distances even farther. It's dizzying to search for distant galaxies at night or watch billowing masses of fair-weather cumuli marching eastward. Scanning a night sky for constellations renders the enormous space and distances beyond comprehension. Wrote author Bill Bryson about watching the northern lights: "You have no idea how immense the sky is until you try to monitor it all."

Perhaps the appeal of big skies is not the vast space itself but the liberating emotion it inspires. If so, people have been feeling that for a long time. Guthrie once wrote that his father, on his first day in Montana in 1901, said "standing under the big sky I felt free."

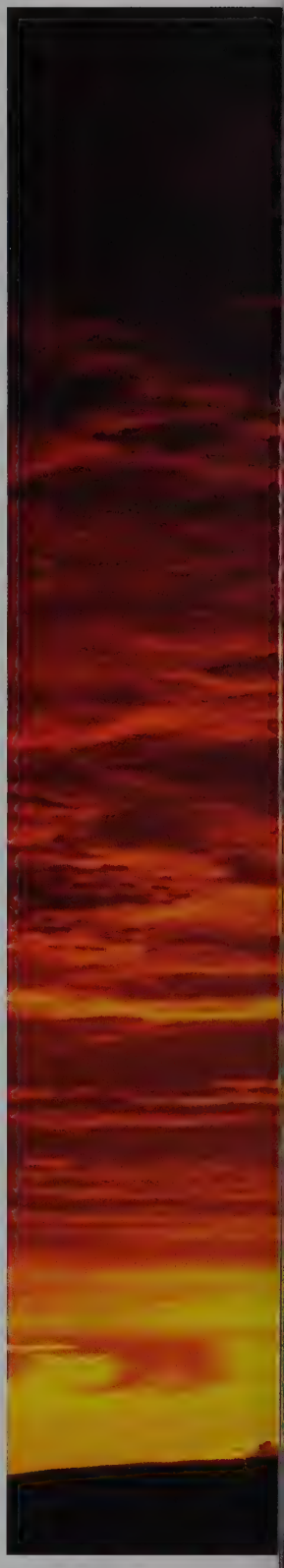
Anyone ambling across the sagebrush flats of Garfield County or summiting a pass on the Continental Divide can still feel that sense of liberation. It's also to be found in the series of upward-looking photos we present on these and subsequent pages.

—Tom Dickson

Jason Savage *Above:* Rainy Lake, Seeley-Swan Valley
Shanna Mae Swanson *Right:* Heavy clouds over Bozeman
Denver Bryan *Below:* Montana sunset



Dana Phipps *Above:* Sunset over stock dams in the Missouri River Breaks, west of Jordan
John Lambing *Above right:* Autumn clouds in western Montana
Mark N. Roberts *Below right:* Summer storm approaching Bozeman



Tony Bynum *Top:* Rafting the Missouri River in the Upper Missouri River Breaks National Monument
Don MacCarter *Above:* Flathead Lake in late spring

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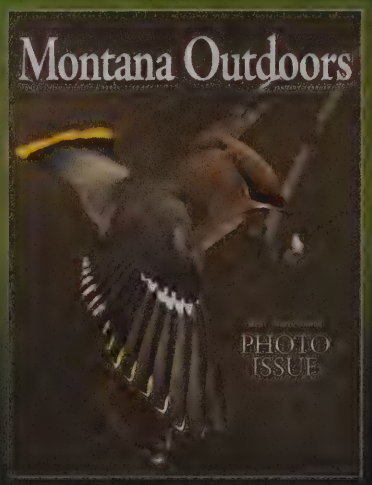

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Steven Akre Square Butte, west of Great Falls

OPEN SPACE INVADERS

Noxious weeds crowd out native plants, ruin rangeland, and cost farmers and ranchers millions.

How Montana is fighting back. **BY DAVID STALLING**

If the commonly used term "war on weeds" seems overly dramatic, consider this: Noxious weeds today infest more than 130 million acres of the United States. Each year they overrun an additional 1.7 million acres, invading an estimated 6 square miles of Bureau of Land Management (BLM) and U.S. Forest Service (USFS) lands every day. Weeds have infested more than 7 million acres in national parks, including Glacier and Yellowstone. Harmful invasive plants are a major scourge of agriculture, which declared the "war." Each year noxious weeds cost Montana producers $100 million in control expenses and crop production losses, according to the Montana State University (MSU) Extension Service.

Invasives also devastate native vegetation, in some cases reducing entire biologically diverse plant communities to large tracts of just one or two dominant species. And by crowding out indigenous grasses and forbs that wildlife eat, noxious weeds reduce the amount of forage available for deer, elk, and pronghorn.

"Noxious weeds" is a legal term state and federal agencies use to denote exotic plants posing serious threats to agriculture, wildlife, and native plant communities. Many weeds reach this continent as seeds inadvertently carried in grain shipments. Others are brought by well-meaning folks to grace gardens or help control erosion. Once here, plants and their seeds hitch rides aboard birds, big game animals, wool pants, horses, trains, and the tires of trucks and all-terrain vehicles. Some simply ride with the wind or float along rivers.

One of the most invasive exotic plants is spotted knapweed, which arrived in North America from central Europe in 1883, mixed in with shipments of alfalfa or soil used as ship ballast. Knapweed has since crowded out native plants on 2.8 million acres in Montana, thriving on soil disturbed by logging, grazing, flooding, or fire. By sending down stout taproots, knapweed gets the jump on other plants with its early spring growth and snatches up space, sun, water, and nutrients. Each plant produces more than 1,000 seeds annually, creating knapseed stands of up to two million plants per acre. According to the Forest Service, such densities can reduce the total amount of native grasses and forbs by as much as 90 percent.

Making matters worse, native plants have a tough time growing back even after

LIDO VIZZUTTI/*FLATHEAD BEACON*

BOTANICAL BARBARIAN A spotted knapweed plant appears to be scouting a route across a highway near Kalispell. Since the early 1900s, the invasive plant has spread to every county in Montana, today covering 2.8 million acres.

knapweed has been eliminated. Documenting the first scientific evidence of a plant using an offensive chemical weapon, researchers at the University of Montana and Colorado State University recently verified that knapweed releases a substance called "catechin" that destroys roots of surrounding vegetation.

The U. S. government recognizes roughly 4,000 exotic plants as "pests." Of those, 90 are federal noxious weeds, and dozens more are listed as noxious by various states. The BLM refers to exotic weeds as "A Growing Pain," the U.S. Department of Agriculture calls them "Silent Invaders," and The Nature Conservancy created "The Dirty Dozen" list of "America's Most Wanted: A Rogue's Gallery of Invasive Plants and Animals." In an article for *Sierra* magazine, writer Robert Devine coined the term "botanical barbarians."

AT THE GATE

Barbarians, indeed. Noxious weeds have a competitive edge over native plants because their natural predators—mammals, birds, insects, and fungi—don't live here. Just as deer and elk proliferate in the absence of predation—human or otherwise—noxious weeds multiply on lands where few natural enemies exist. In Montana, aggressive species such as leafy spurge, spotted knapweed, and Dalmatian toadflax take over prairies, wetlands, sagebrush steppes, mountain parklands, and riverbanks. Though research on the ecological effects is spotty, scientists know that invasive plants greatly reduce biological diversity in native plant communities. And because the roots of weeds hold less soil than native vegetation roots, erosion increases dramatically where invasives such as knapweed dominate. Topsoil sloughs into streams and fouls spawning and rearing habitat critical to trout and other fish. An MSU study published in 1989 found that surface runoff and sediment loss were nearly three times higher on sites dominated by spotted knapweed than on those where native bunchgrass predominated. In a Wyoming study, sites dominated by native prairie bunchgrass lost only 12.5 pounds of soil per acre in a simulated thunderstorm, while sites overrun by spotted knapweed lost more than 125 pounds per acre.

Noxious weeds also threaten native plant communities in national parks. During one three-year period in Glacier, spotted knapweed nearly eliminated seven rare or uncommon native species. Yellowstone reports widespread infestations of Dalmatian toadflax and Canada thistle.

The few studies on how noxious weeds affect wildlife raise concerns among conservation agencies and organizations. Researchers at the University of South Dakota found that deer and bison used areas dominated by leafy spurge far less than similar uninfested sites. A study in the early 1990s by Mike Thompson, now FWP regional wildlife manager in Missoula, found that dense stands of spotted knapweed in native bunchgrass sites reduced available winter forage for elk. "We can't go so far as to conclude that noxious weeds reduce elk *numbers* in Montana," Thompson says. "That's because in much of the state we're already managing populations below the land's biological carrying capacity, in order to reduce wildlife depredation problems on private land. But weed infestations definitely make a difference in elk *distribution*. If you have more weeds on public lands, elk could move to other property where there are fewer weeds."

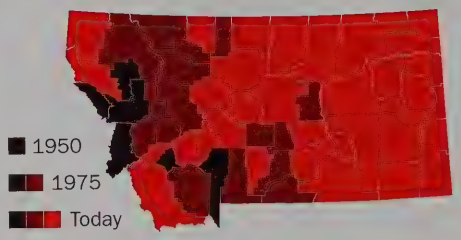
Nonprofit conservation groups are concerned, too. The Nature Conservancy and the Rocky Mountain Elk Foundation have warned of the threat noxious weeds pose to wildlife and native plant communities.

Then there's aesthetics. Though noxious

Dave Stalling is a past president of the Montana Wildlife Federation and a previous conservation editor at Bugle. *He currently lives in Berkeley, California, where he is the communications director for Trout Unlimited of California.*

Spotted knapweed's rapid spread

Montana counties reporting infestations of spotted knapweed over the past 60 years.



Know thine enemies

Shown here: Montana's five worst noxious weeds. State officials warn the public not to walk or drive through established infestations of these and other invasive vegetation.

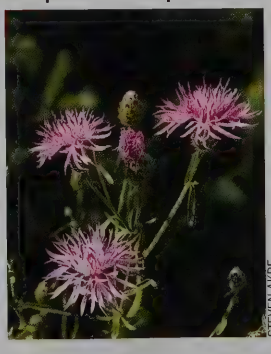
Houndstongue

JOSEPH M. DITOMASO, UNIVERSITY OF CALIFORNIA

Dalmatian toadflax

STEVEN AKRE

Spotted knapweed


STEVEN AKRE

Leafy spurge

CHRIS EVANS/BUGWOOD.ORG

Canada thistle

JAMES M. STREETER

JAMES M. STREETER

weeds sprout colorful flowers, people who value native plant communities wince at the sight of knapweed overtaking shortgrass prairie or leafy spurge spilling over riverbanks. And few sights are more discouraging to dog owners than their Brittany, springer spaniel, or golden retriever covered in houndstongue or burdock seed.

"It's easy to get depressed about noxious weeds," says Jim Olivarez, a retired weed program manager for the USFS Northern Region. "But I try to look at it this way: About 95 percent of our public land is not affected by weeds, and we can keep it that way. I refuse to let these plants dominate the landscape. These lands are national treasures, and we need to protect them."

MAKING HEADWAY

Montana has been fighting noxious plants for more than a century. The state legislature passed its first laws to control weeds as early as 1895. Yet by the late 1920s, invasive exotic vegetation had spread to every county in the state. Today, 32 species infest 7.6 million acres of Montana.

In 2000 Montana developed a comprehensive, statewide noxious weed management plan. Its goal is to boost existing weed management and promote new, ecological ways of controlling weeds. The plan notes that noxious weeds are controlled by identifying ways the plants are spread, educating landowners and others on how to limit spread and prevent introductions, and conducting plant inventories and research. Weeds are killed using herbicides, fire, hand pulling, and insect predators (known as biocontrols.)

Dave Burch, state weed coordinator with the Montana Department of Agriculture, says this "integrated" approach is making inroads into existing infestations. Spotted knapweed has taken the biggest hit, declining from 4.5 million infested acres in 1985 to about 2.8 million acres today. Though that reduction has been partly offset by new infestations of other species, over the past decade Montana has reduced the amount of land with noxious weeds by 500,000 acres.

According to the 2008 Montana Noxious Weed Summit Advisory Council, private land managers, county weed districts, and federal and state agencies now spend a total of $21 million each year in Montana on noxious weed control. (The council calls for spending nearly three times that amount to slow the spread and reduce existing infestations by 5 percent each year.)

In addition to containing and eradicating weed infestations, a major goal of the weed war is to prevent new noxious plants from taking hold. Public education is critical. Burch says the more people who know about noxious weeds, the more likely early infestations can be detected and then treated before the plants take over. He tells

JAMES M. STREETER

COLORFUL CREEPS Nicknamed "leafy scourge" by some land managers, the yellow blight of leafy spurge is shown at top covering Missoula's Mount Sentinel. On nearby Mount Jumbo (above), purple spotted knapweed has driven out native vegetation, turning a biologically diverse plant community into a monoculture that wildlife rarely eat. With limited success, the city and the University of Montana have used herbicides, goats, and weed-eating insects to contain these and other noxious weed infestations.

FWP's battlefront on FWP lands

FWP

GIVING WEEDS THE BLUES A contract worker sprays weeds at a fishing access site on the Missouri River. Last year FWP managed noxious plants—including the release of 11 million weed-eating insects—on more than 8,000 acres of its properties.

At the new Marias Wildlife Management Area and State Park near Shelby, FWP has released root-boring weevils at 20 different sites to control noxious weeds. The department also spot-sprayed herbicides on roads, trails, and river corridors, and aerially sprayed 300 acres. "Keep in mind that the previous owner had done no weed control at all for the previous 50 years, so it will take us some time to get a handle on the weeds there," says Graham Taylor, FWP regional wildlife manager in Great Falls.

The activities at Marias are just a snapshot of the noxious weed control FWP does at state parks, wildlife management areas (WMAs), and fishing access sites. In 2010, the department:

- conducted weed management on 8,430 acres;
- spent $642,000 for on-the-ground weed control, weed education and outreach, and other weed management work;
- provided $143,000 to Block Management Program landowners for weed management (in addition to $4 million in Block Management payments for activities such as weed management that help offset the effects of allowing public hunting access);
- provided $1.2 million in federal grants to private organizations and public municipalities and agencies for hiking, cross-country skiing, snowmobiling, and other recreational trail projects, all requiring weed management plans and frequently including weed-control actions;
- worked with ranchers to conduct rest-rotation cattle grazing on some WMAs to maintain rangeland health, in part so native plant communities can resist weed invasions;
- collected and released 11 million biological control insects on infested sites for long-term control, benefiting the FWP lands and those owned by adjacent landowners;
- contracted with county weed districts and private contractors to spray weeds;
- conducted an aggressive media campaign warning hunters and other recreationists to be aware of weeds and avoid spreading seeds or plants; and
- regularly convened its Noxious Weed Management Advisory Committee to discuss and act on weed issues.

"I'm encouraged to see how our long-time managers pass their experience and knowledge about noxious weeds to the new managers," says Joe Weigand, FWP noxious weed coordinator. "They're committed to not lose any ground they've gained over the years." ■

FWP PHOTOS

HEALTHY HILLSIDE Before and after shots show how FWP controlled a leafy spurge infestation on Garrity Mountain Wildlife Management Area near Anaconda. Though the department employs biocontrols and hand pulling as part of its integrated approach to managing noxious weeds, sometimes broad herbicide applications are the best long-term way to save native plant communities and maintain wildlife forage production.

of a retired Forest Service employee who reported a stand of yellow starthistle discovered while hiking near Dillon. The county weed district quickly treated the site. "That shows how important it is for people to be able to identify weeds and report them to us," Burch says. "Yellow starthistle is not prevalent in the state, and we want to keep it that way."

GOOD NEIGHBOR

FWP is a key player in the state's noxious weed management plan. Joe Weigand, the department's statewide weed coordinator, says FWP is responsible for managing noxious weeds on 610 sites across the state comprising 410,000 acres. Working with state, federal, and county programs, the department spends roughly $650,000 each year for on-the-ground weed control and other management, in addition to several million dollars in grants and other payments that landowners and others may use to manage weeds (see sidebar at left). Along with educating the public and applying herbicides, FWP's integrated management approach includes pulling weeds by hand, using cattle grazing to help native range resist weed invasions, and releasing beetles and other natural insect predators to attack the weeds. "We use every tool available," says Weigand.

Thompson says being a good neighbor is a top priority for the department. "Wildlife management areas are part of a community, so we put a lot of emphasis on controlling weeds along the borders with our neighbors," he says. "We understand that a landowner on one side of the fence can spend a ton of money on weed control and then see those efforts wasted if the neighbors aren't doing their part too." Weigand adds that FWP is required to control weeds on its lands, and that a law passed by the 2009 legislature mandates the department to develop a noxious weed management plan for any land it proposes to buy.

While nearby landowners support FWP weed control, other Montanans criticize the department for using herbicides. The chemicals can harm native wildlife forage and, when used at fishing access sites, contaminate streams and lakes. Weigand says the department is using more biocontrols to reduce the need for chemical applications. "We're very cautious about how, when, and where we apply herbicides," he says. "But broad herbicide applications are necessary where we have massive weed infestations, especially to save wildlife forage production. In the long run, we believe eradicating noxious weeds is best for the land and for wildlife, and using herbicides is usually the lesser of two potential evils."

One thing's for certain: Noxious weeds aren't going away by themselves, whether on FWP lands or any others. The looming threats to agriculture and natural ecosystems mean that Montana can't stand by and do nothing. To keep existing infestations from spreading and prevent new species from taking root, the state may have to be as pugnacious and persistent as the weeds themselves.

> Wildlife management areas are part of a community, so we put a lot of emphasis on controlling weeds along the borders with our neighbors."

Join the fight

The best way to battle noxious weeds is to prevent new infestations and stop the spread of existing ones. Here's how:

- Learn to identify plants common to your locale and favorite recreation spots so you can recognize potential invaders and report them to public agencies.
- If you travel with pack animals, carry only certified weed-seed–free forage (pellets, hay, and alfalfa) into the backcountry.
- Thoroughly clean vehicles and livestock before entering the backcountry to ensure they are not carrying weed seeds.
- Avoid traveling through weed-infested areas, where seeds can hitchhike on tires and clothing and be inadvertently spread to other parts of Montana.

ISTOCKPHOTO

GETTING AN EARFUL Upland hunters and other dog owners should clean houndstongue and other nasty weed seeds off their pets and clothing at home and not in their vehicles or in the field.

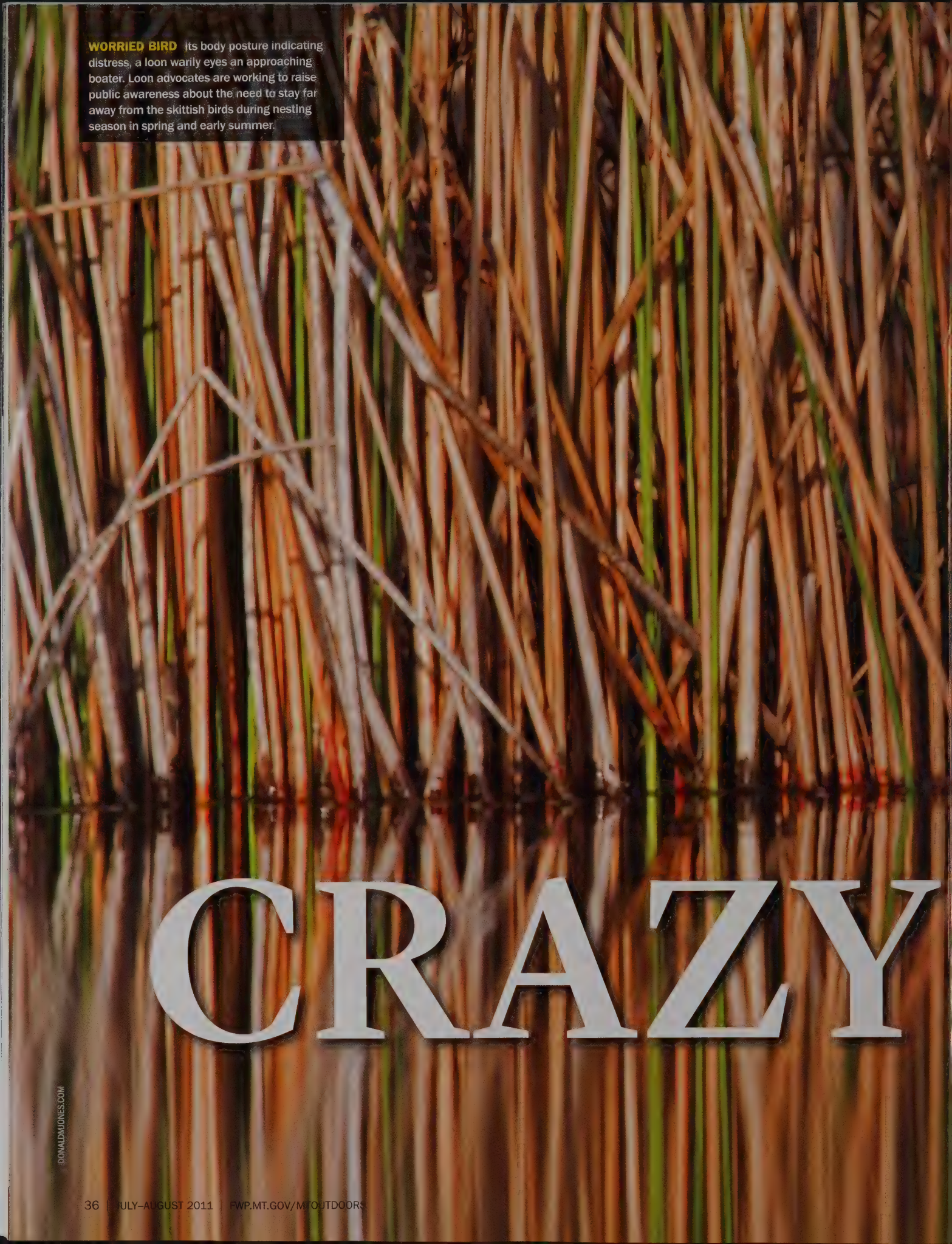
For more information:

FWP Noxious Weed Management Program
fwp.mt.gov/habitat/noxiousWeeds or e-mail: joweigand@mt.gov

Montana's Statewide Noxious Weed Awareness and Education Program:
weedawareness.org

Montana Department of Agriculture Noxious Weed Program:
agr.mt.gov/weedpest/noxiousweeds.asp or e-mail: dburch@mt.gov

The threat of aquatic invasive species, including plants:
fwp.mt.gov/mtoutdoors/HTML/articles/2010/AIS.htm



WORRIED BIRD its body posture indicating distress, a loon warily eyes an approaching boater. Loon advocates are working to raise public awareness about the need to stay far away from the skittish birds during nesting season in spring and early summer.

CRAZY

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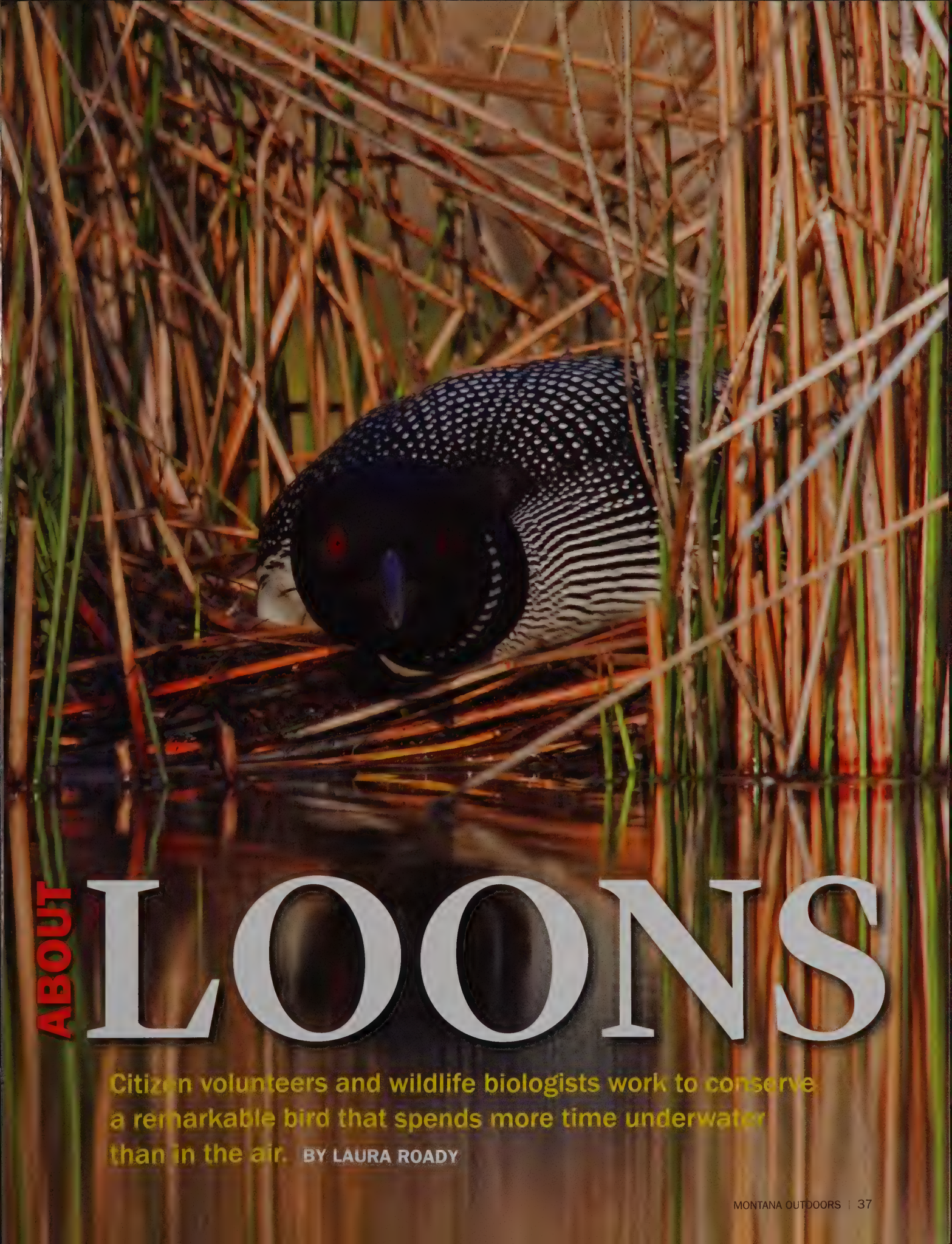

ABOUT LOONS

Citizen volunteers and wildlife biologists work to conserve a remarkable bird that spends more time underwater than in the air. BY LAURA ROADY

Each summer I'm drawn to northwestern Montana's lakes—not for fishing or boating, but for the prospect of seeing and hearing a common loon. Loons are strikingly handsome, with red eyes, a daggerlike bill, and distinctive black-and-white zebra markings on the throat and checkering on the back. Because the fish-eating birds live in clean, deep North Woods lakes, loons have become symbols of unspoiled wilderness. So beloved are they in Canada that their likeness adorns the nation's one-dollar coin, affectionately called a "loonie."

The birds are well known for their haunting call that echoes across the water. It's a sound that reminds me of childhood vacations in northern forests. "I could lie awake for hours listening to it, it is so thrilling," wrote Henry David Thoreau.

In Montana, little was known about the species until the early 1980s. Scientists and citizens had became concerned about loons after reports a decade earlier of DDT accumulating in fish-eating birds. Citizen volunteers conducted a study to define the summer breeding range of loons and the characteristics of lakes where the birds nested. They found that most loons in Montana live north of Missoula and west of the Continental Divide, with a few nesting on the eastern side of the Rocky Mountain Front. The initial estimate of 40 breeding pairs established Montana's loon population as the largest, other than Alaska's, in the western United States.

What was still unknown, however, was whether the population was growing or shrinking. Also: How did motorboats and other disturbances affect Montana's loon population? And were the region's growing number of shoreline cabins and homes harming loon habitat?

According to Don Skaar, who led those first loon studies, he and others noticed that many loon nests had been abandoned or contained dead chicks. "We realized that human disturbances were causing loons to leave their eggs or abandon their young," says Skaar, now a senior Fisheries Bureau manager with Montana Fish, Wildlife & Parks. "Loons typically lay two eggs, but we were finding nests with only one or even no chicks."

SUMMER COUNT

Determining the population trend and the effects of humans on loon nesting success required monitoring the birds each year. In 1986, the newly formed Montana Loon Society launched Loon Day, a volunteer effort to count loons and determine chick survival. The midsummer survey, which celebrates its 25th anniversary this year, recruits volunteers to record loon behavior, locations of loon sightings, numbers of adults and juveniles, nest sites, and other information on 300-plus lakes in northwestern Montana. The volunteers also track loons banded each year since 2003 as part of a long-term FWP study.

> "We realized that human disturbances were causing loons to leave their eggs or abandon their young."

Chris Hammond, an FWP wildlife biologist in Kalispell who helps coordinate Loon Day, says surveys during the past 15 years have found a relatively stable population of roughly 180 to 200 total loons (which includes 50 to 70 breeding pairs). "That's definitely good news," he says. "It shows the population is about where it should be for the amount of habitat out there."

Good news, yes. But also puzzling. Studies by Lynn Kelly, founder and president of the Montana Loon Society, and biologists in other states show that loons will not tolerate boaters, anglers, and others coming within a few hundred feet of their nests, which usually sit along shorelines of islands and peninsulas. "When disturbed by an approaching boat, loons typically slip off their nests—leaving the eggs exposed to cold and predators—and they won't return until the boat leaves the area," says Kelly. That should happen more often as more people use northwestern Montana waters. For example, an FWP study found that the number of boats on the Flathead River and associated backwaters more than quadrupled between 1992 and 2008. With more boats on loon waters, why aren't more birds abandoning their nests?

Freelance writer Laura Roady lives in Bonners Ferry, Idaho.

LOON RANGERS

"We can't prove it, but we're pretty confident we are mitigating those effects with public outreach and education," explains Gael Bissell, an FWP wildlife biologist in Kalispell. Each spring since 1989, department staff and Loon Society members place yellow floating signs roughly 100 yards from active nesting sites on about 35 busy lakes. The signs alert boaters to keep their distance during the critical nesting season from early May through late June. In addition, each summer FWP hires three interns—usually college students—to tour the signed lakes. Known as loon rangers, the interns explain the yellow signs to boaters, give evening presentations at campgrounds, and meet with cabin owners and other lake users to explain why loons need privacy, especially during nesting season. They also clear up common misconceptions. For instance, when a loon makes its "laughing" call as people approach, it's not because the bird is happy. "It's actually a distress call

BATHING BEAUTY
Flapping its wings, a preening loon shows off its distinctive white checkering and spots, which help camouflage it from eagles and other predators.

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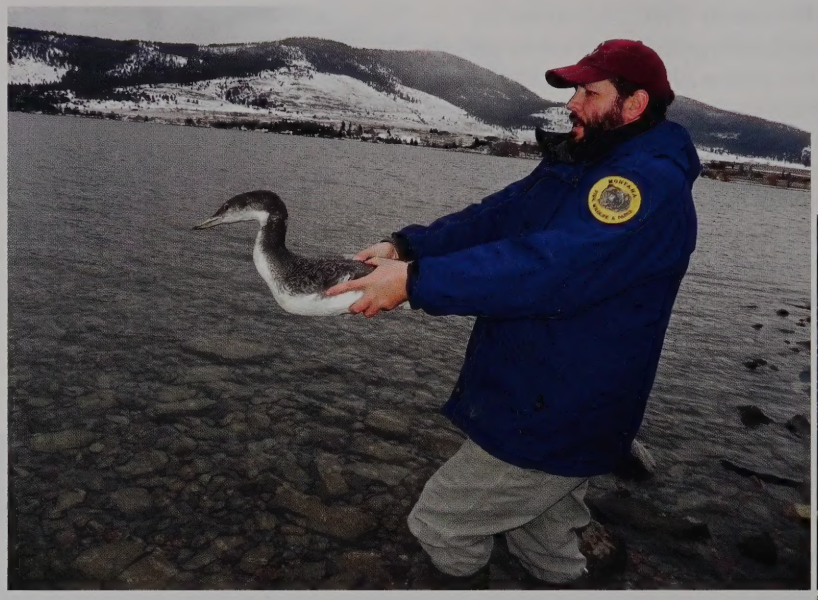

CLOCKWISE FROM TOP LEFT: FWP; FWP; MICHAEL HARING

BE FRUITFUL Left: FWP biologist Chris Hammond releases a study loon captured at Flathead Lake. Below: Members of the Montana Loon Society place warning signs near a nest. Bottom: Dense bones allow loons to sit lower in the water and dive more easily to catch fish.

that means, 'Move away!'" says Kelly.

Bissell says the signs, loon rangers, and years of public education by Loon Society members are paying off. "I think the reason Montana's loon population is stable is because people are learning to leave loons alone so they can reproduce, even in areas with growing public use," she says. Hammond notes that Ashley Lake, a few miles west of Kalispell, is ringed by more than 400 homes and cabins yet continues to support four breeding pairs of loons. "The homeowners' association has been essential. Members go out and spread the word to their neighbors and boaters about reducing disturbances to nesting sites," he says.

Hammond adds that when six-month-old juvenile loons migrate to wintering waters on the West Coast for their first time each fall, only 17 to 25 percent survive to return to Montana two and a half years later. "That's why reducing nesting disturbances is essential," he says. "So many juvenile birds are lost to predators and other natural causes that we need to help loons pump out as many chicks as possible each summer to make up for that loss."

In 2008 FWP changed the status of Montana loons from "at risk" to "potentially at risk." The upgrade reflects the stable population. But Kelly points out that the state's loon population is still vulnerable. Though larger than those in most states, Montana's loon numbers are hardly booming. And because loons don't breed until age seven, and then produce only one or two chicks each season, "it wouldn't take much to knock the population down to the point where it couldn't recover," she says.

Breeding loon populations in California, Oregon, and Utah became extinct in the mid-20th century. With that possibility never far from their thoughts, Kelly and other loon advocates remain committed to maintaining the state's population in the face of growing lake recreation and development. Hammond points out that loons are able to tolerate increasing public use of Montana's lakes—but only to a point. "The key is to give them the space they need for nesting and during those first few weeks when the chicks hatch and are out with their parents," he says. "The idea isn't to limit recreational use or restrict where boaters and anglers can go, but to let people know that loons need some seclusion in late spring and early summer. If we can do that, there's no reason loons and people can't keep enjoying these lakes together."

> "If we can do that, there's no reason loons and people can't keep enjoying these lakes together."

This year's Loon Day is July 16. To participate, contact Chris Hammond at (406) 751-4582 or chammond@mt.gov or visit the Montana Loon Society's (MLS) website, montanaloons.org. Find information on Montana loons—including advice for lakeshore owners on loon-friendly land practices—at the MLS website. Read the most recent Montana loon conservation plan on the FWP website at fwp.mt.gov/wildthings/management/commonLoon/.

PAT MUNDAY

Big sagebrush

Artemisia tridentata***

* This genus of several hundred plants belonging to the aster family derives from Artemis, the Greek goddess of hunting who befriended wild animals and plants.

** Latin for "three teeth," referring to the three lobes on the leaf.

BY LEE LAMB

Sagebrush country can appear monotonous and desolate if only viewed from the highway. But those who venture into these plant communities discover beauty, diversity, and color. Montana's extensive rangelands contain 16 types of woody sagebrush, including four subspecies of the most common variety, big sagebrush.

Identification

Big sagebrush, the tallest sagebrush species, grows up to 15 feet high. A woody perennial member of the sunflower family, big sage has a round shape with a relatively short trunk supporting many stout, upward-growing branches. Big sagebrush sprouts grayish-green, three-lobed, fan-shaped leaves covered with silky silver hair each spring and fall. The leaves emit a sweet, pungent odor throughout the year. They remain on the plant through winter, providing green, nutritious forage to pronghorn and other wildlife during the cold months. Big sagebrush flowers in August and September, producing dense clusters of small, inconspicuous blossoms.

Montana native Lee Lamb is a writer in Coeur d'Alene, Idaho.

Range

Big sagebrush is the most common and widely distributed sagebrush species in the western United States and Canada. It ranges from British Columbia and Alberta south through the western states to northern New Mexico and east to the Dakotas and Nebraska. In Montana it grows in valleys and basins and on plains, plateaus, and mountain slopes nearly everywhere except for a swath of central Montana north of U.S. Highway 2 and in the state's far northwestern corner. Highly tolerant of drought, big sagebrush does best in well-drained soils.

Subspecies

Montana is home to four of the six big sagebrush subspecies: basin, Wyoming, mountain, and subalpine (or spicate). While their ranges occasionally overlap, precipitation levels and soil type determine where each subspecies grows. You're more likely to find the mountain and basin big sagebrush subspecies in the deeper soils of wetter southwestern Montana. Subalpine big sagebrush is mainly found in the wetter Hebgen Lake area. And Wyoming big sage is most common in the shallower soils of drier eastern Montana.

Wildlife Value

Sagebrush isn't a favorite of livestock, but wildlife find it delectable and nutritious. Sage-grouse, sharp-tailed grouse, sage and Brewer's sparrows, sage thrashers, and pygmy rabbits can't survive without the food, nesting cover, and escape cover that big sagebrush provides. A sage-grouse eats nothing but sagebrush leaves in winter. Pronghorn take advantage of big sage's highly digestible crude protein, eating substantial amounts throughout the year. Mule deer feed on the plant every season except summer. Elk, jackrabbits, and many other birds and small mammals rely on big sagebrush in varying degrees for food and shelter. One biologist calls sagebrush stands "the forests of the prairie."

Fire

Big sagebrush can withstand bitter cold, severe drought, blazing heat, and relentless winds. A single plant can live for 200 years. The only thing big sage can't survive is fire. And because the plant is slow to reestablish after a fire—100 years to recover an old-growth sage stand—burning is the main way sage is eliminated in an attempt to make land more hospitable to cattle and crops.

Status and Management

Montana has lost about half its original big sagebrush country to plowing, burning, and herbicide spraying. That's been tough on wildlife. "The decline of species like mule deer, pygmy rabbits, and sage-grouse is directly tied to a decline in sagebrush itself," says Mike Frisina, FWP range and habitat coordinator. "As the sage goes, so goes our wildlife. We know we have to better manage sage—and change public attitudes—if we are going to save these wildlife species."

FWP has bought conservation easements that protect some sagebrush lands using Habitat Montana dollars. Though sage continues to be removed across its range, Frisina says some landowners are working with FWP to conserve sagebrush grasslands through the Montana Sagebrush Initiative. Using primarily federal funds, the program has secured roughly 200,000 acres of sage through 30-year leases that give landowners a one-time payment of $12 an acre to protect sagebrush grasslands used by sage-grouse.

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